Let's Go To Work!

THE national election is over.

The political administration is now set for the next four years.

Never before in the history of this or any other country has a leader been chosen or elected by the free and voluntary votes of the people in such overwhelming volume as President Roosevelt was elected on November 3 last. The result of the balloting is unprecedented, significant and impressive.

How will the tremendous placement of political power in the hands of the present administration be handled in the next four years? Nobody knows—not even the administration or the chief executive at this writing.

What then is there to do about it? The first thing to do is to roll up our sleeves, quit talking politics and go to work.

Contrary to the pre-election period in all former national election years, business has maintained its attained volume without slow-down, although there never was a former election which employed so many citizens in purely political efforts as this recent pre-election period.

Business activity a month ago had reached a high of 76.6 per cent. For the week ending October 24, business activity was 75.3 per cent of normal against 67.4 per cent a year ago for the corresponding week.

The year 1936 is destined to end with the best maintained volume during the past six years. And for 1937, the indications are that business volume will attain a high of 90 per cent of normal—perhaps higher.

Almost every division of industry is showing a remarkable volume recovery. But there are some industries which contain divisions which show most remarkable records. The paper industry is one.

The sulphate division of the paper industry is breaking all previous records for volume production and shipments. Although the general business activity figure is but 75.3 per cent of normal, the sulphate division of our industry consisting of some fifty different paper mill companies and corporations, have, in the aggregate, reported orders received in the past sixty days ending October 24 of an average of 97 per cent of capacity, and shipments, 92 per cent of capacity, and still the volume maintains. For the week ending October 24, orders received were 103.5 per cent of capacity and shipments 93.2 per cent of capacity. In other words, while general business recovery is only 75 per cent of normal, the sulphate division of the paper industry is running well over 90 per cent of capacity.

The natural query is: What will the sulphate industry do next year when business recovery reaches 90 per cent of normal?

The answer is: When business finds that the sulphate division is sold so far ahead that commercial deliveries are not to be had, orders will revert to the sulphite division, which still has some free tonnage to place.

The point is that the paper industry was not and will not be affected by the general elections. The tide of business recovery has turned definitely and irrevocably upward. Nothing can stop it until it has reached its flood stage, which, in accordance with our judgment and in view of the continuance of the present administration, will continue its upward swing for some years to come.

Adjustment to the voters' decision on November 3 is not going to be a hard job—at best, it will call mostly for a mental adjustment.

America has a new era before it.

+ EDITORIAL +

The Heights of True Thankfulness

THE season is at hand when the people of America follow the national tradition and give thanks for the blessings they have received during the past year. This custom has had a deep and lasting effect upon the lives of our countrymen. It has lifted their souls to a greater plane of righteousness; it has enriched their lives both spiritually and materially.

It is so easy to be thankful for that which we already have, but is real gratitude merely the overflowing expression of a heart that has been blessed? Is it evidenced only when there is an ever-constant supply of material blessings? It is always easy to thank a benefactor, but it is not always so easy to be grateful for that which we expect to receive. Perhaps, then, the lesson we need to learn most of all is to trust the Giver of all blessings for our daily sustenance; to express our faith in this constant supply by giving thanks not only for what we already have received but also for that which we know will be ours. In so doing, we shall really attain the heights of true thankfulness.

Time to Think

SNAP judgment is all right in its place. Business leaders frequently have to use it. Situations develop that need immediate decisions and it is up to them to make them.

Right or wrong, decisions get action. That is the purpose behind them. Therefore, it is imperative in the successful functioning of any business that the batting average of snap judgment decisions be high. Too many errors would result in failure.

Decisions of this kind, however, which appear to be made on the spur of the moment are not always snap judgment decisions at all. They oftentimes are made quickly as a result of a background of years of experience, or because there is full and complete knowledge of the situation at hand.

Sometimes situations are met as a result of right thinking. Maybe it should be called strategy. The exigency arises and an immediate decision given as to ways and means of handling it, all because a similar situation had been foreseen previously and a decision rendered and catalogued in the mind for such future use as could ever be made of it.

It is believed that it would be good for business if some of its executives were given more time to think rather than being loaded up with detail. The handling of too much detail makes little more than automatons out of them, and when an occasion arises that demands critical judgment, they are not in position to render it.

Duties of executives most certainly should not be assumed or allocated beyond a point where time can be found by them to think. It is not a question of procrastination, but rather of an opportunity to give constructive thought to the business.

Constructive thought develops worthwhile ideas. Ideas are tools. Worthwhile ideas are good tools which, when put to work, make for progress. They not only reveal hidden weaknesses which then can be strengthened, but they actually point the way to new and greater possibilities for accomplishment.

Take time to think and allow time for it to those in your organization whom you council for advice.

An Open Mind

MILLIONS and millions of dollars are being invested in new pulp and paper mills. A number of these mills are now in process of construction. One of them has just recently been placed into production. Others are being contemplated.

Never before in the history of the industry has there been so much construction activity at one time.

Such developments give the executive, the mill operator and the engineer an opportunity to use their individual talents to the utmost.

Numerous are the problems to be solved before any of the new plants go into production. Decisions have to be made before a project can be undertaken.

What kind of mill shall be built? Where shall it be located? How much will it cost? What are its opportunities for profit? How can the money be obtained to finance it? These questions and many more must be decided upon by the sponsors of a project.

Once the nature of the plant, its capacity and the site for its location are determined, it becomes necessary to design and build the mill. How desirable it is in this work, as well as in formulating the plans for the enterprise, to keep an open mind. The mill when built should fill a need. It should make a profit for its investors. Those are the two primary reasons for the establishment of any business.

The mill operative and the engineer must design a plant that will function economically. They not only must be familiar with all of the latest technological developments, but with the trend in machinery development as well.

New processes should be scrutinized carefully and their possibilities weighed in the balance of past experience. The possible efficiency of recently designed machines should be compared with machines which already have received an acceptance.

Since the building of one of these plants is not for today, but for tomorrow, the importance of right decisions cannot be overestimated. Production efficiencies, and, in turn, profits will be dependent upon them.

A guiding thought in making these decisions might well be "The stone which the builders refused is become the head stone of the corner."

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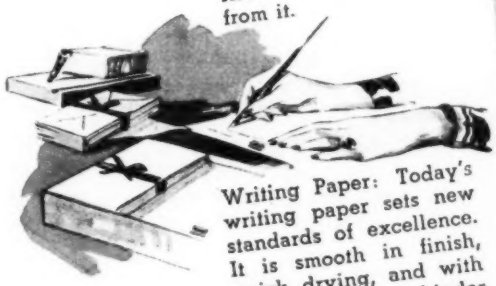
Kraft paper that is really white! The result of a new accomplishment in the science of paper bleaching.

Paper progress is redesigning modern interiors. Brilliant brocade-like fabrics for drapes, and handsome rugs are being made from paper pulp.

An amazing new fabric made from paper pulp imparts novel charm to milady's costume. Stylists enthusiastically endorse the chic gloves, hats, handbags, shoes, belts that are being made from it.



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Random Thoughts

WILLIAM SIBLEY

◆ THIS ARTICLE could not be titled differently since I am writing it on the eve of election, and am capable only of random thoughts.

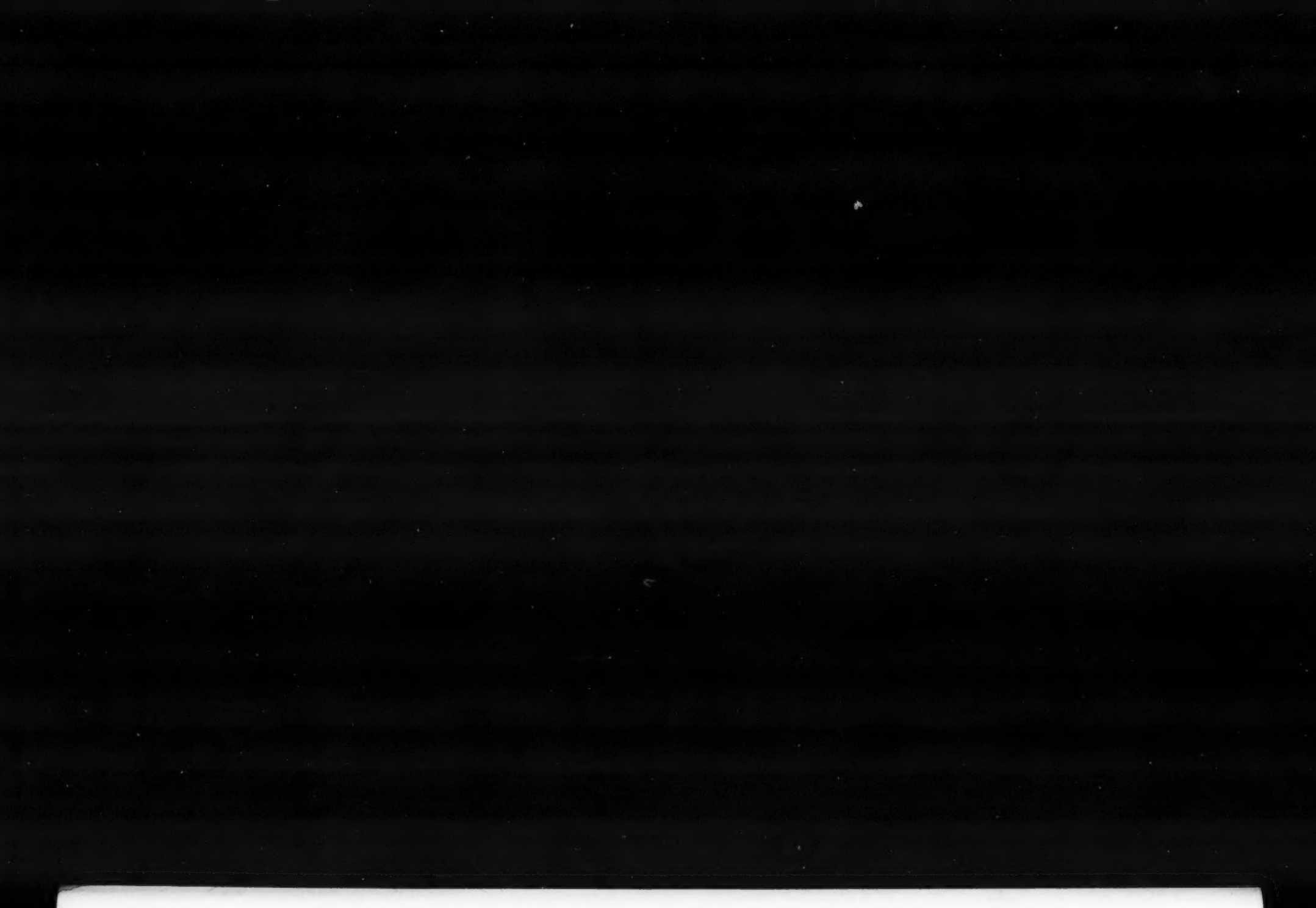
◆ ON MICHIGAN AVENUE, not far from the office building which houses my tiny private cubicle, there is a jewelry store. And in the window of that jewelry store there sits a clock "Guaranteed to give the correct time." It being there, hundreds of people pause to adjust their watches. . . . Immediately opposite the building near the Michigan Avenue Bridge, there stands a huge, well illuminated billboard. Should someone print on that billboard a great and deep-going truth—some beautiful poem or epigram which in itself contained the essence of all that is fair and good—how many people would pause before it—to adjust their minds?

◆ HAVE YOU EVER stopped to think of the magnificence of Paderewski? A master pianist who had thrilled tens of thousands and who had garnered the harvest that comes with the plaudits of such audiences. Then to have taken the helm of a broken and confused country and truly led the bewildered out of the wilderness. And, years after he had closed his beloved piano, he spent endless hours rehabilitating his fingers, until now, at the age of 76, he again thrills not tens of thousands, but millions, through the medium of sound pictures! At the age of 76 he is still going, more masterfully than at the age of 36! What a man! Let us bow our heads in tribute! . . . Would that every industry, paper included, had such a man.

◆ ADVICE TO THE LOVELORN: Never marry anyone whose hobby is work! (Shhh-h-h-h! This is Mrs. Sibley writing). Hobbies are healthy, wholesome, cultivating and altogether desirable if they are of the right kind. Gladiolae, yachts, calliopes, guns, tea pots, stamps, canes, gold fish, vases, rugs, pipes, *anything*–but work. Quite unfortunately, I married a man whose hobby was *work*. This is the year 1936, and the only day this whole year my husband has laid away his office work for an entire 24 hours was Labor Day—early in September. New Year's Day, Decoration Day, Fourth of July, Saturday afternoons, Sundays he was at the office for anywhere from two to twelve hours. Why? I don't know. Work? Perhaps! But he doesn't earn much! Frankly, it wasn't an excess of work . . . it really is nothing but a habit—a hobby. And therein lies the pity of it. Because, being Mrs. Sibley, I know that one's mentality needs the perspective of the spider as he spins his web on the twig to catch the stray grasshopper; the army of ants as they march in military array against their neighboring tribe; the swallow as it finds its way through the blue sky to the place where tree frogs sing and katydids click. Only by such contrast can the metropolitan mind keep its balance. And such minds, deprived of such balances, come to think that the United States is all in Cook County or on Manhattan Island. And that is wrong. Never marry a man whose hobby is work.

◆ BY THE WAY, advertising appropriations are up. Had you heard? And to what point is that thought interjected here? Just this: the larger the advertising appropriations the more paper is used . . . and, therefore, the more paper you sell. But to him who goeth after shall the orders be given. . . . Not necessarily to him who spendeth the greatest amount of shoe leather. But to him who exerciseth the greatest amount of true brains a-gunning the orders therefor. During the ensuing twelve months there will be much inferior paper sold, not because it is inferior or its price smaller, but because the seller thereof either had persistence or an idea for its use. Either will do the trick. The business of 1937 (enlarged over that of 1936) will go to him who hath brains and perseverance.

◆ DURING THESE DAYS of late autumn do you, too, experience that feeling of anathema when you enter your office and go to work. Lethargy, indolence, ineptitude enter upon your soul and you sit there, behind your desk, looking at the papers and wondering just what would happen if you should suddenly and impetuously throw them all in the waste basket! But somewhere between 11:30 and 12:30 at night every fiber in your body awakens and you find yourself consumed with a desire to kill that cockroach, e'n though it takes you repeatedly from one end of the apartment to the other, the while waving frantically a bedroom slipper in the right hand! "Believe it or not," Mr. Ripley, I killed a cockroach, thus, last night! Murderer though I am, I still exult with the feeling of accomplishment!



ADVERTISING PAGES REMOVED

THE PAPER INDUSTRY
A MONTHLY EDUCATIONAL JOURNAL

Distribution of Power in a Sulphate Mill

E. L. COWAN[1] and W. C. BARNWELL[2]

ENJOYING, as it does, proximity to one of the largest saw mills in the world, the Bogalusa Paper Company, Inc., located in the heart of a lush stand of pine at Bogalusa, Louisiana, presents an interesting case study of electrical and steam generation and distribution in a sulphate pulp and paper mill because of the diversity of its power sources.

These power sources, to be mentioned in the following order are: natural gas, cutting refuse from the Great Southern Lumber Company, and bark removed from the pulp logs, exclusive, of course, of the steam generated through the burning of black liquor in three boilers in the recovery room of the plant.

Located in the boiler house are two high-pressure gas-fired boilers, one a 1000 hp. water-tube type operating at 450 lb. steam pressure and 600 degrees temperature; the other a 1022 hp. water-tube boiler operating at 450 lb. steam pressure and 700 degrees total temperature. In addition, are two boilers of a capacity of 1000 hp. each of which operate at 150 lb. steam pressure; both of these use natural gas for fuel.

The natural gas used for fuel originates in the Jackson, Mississippi, field, and is piped to Bogalusa in a 14-inch welded pipe line operating under a pressure of approximately 300 lb. per square inch. On the outskirts of Bogalusa is located a reducing and regulating station which reduces the pressure to 50 lb. per square inch before the gas is brought to the plant regulating station located just off the property of the Bogalusa Paper Company where the pressure is further reduced to 25 lb. per square inch before entering the meter-runs, from which point the gas is brought directly into the headers in the paper mill where it is passed through an orifice meter and an accurate record of its temperature, gravity and B.t.u. heating value is kept.

Five 250 hp. horizontal return tubular boilers operating at 150 lb. steam pressure are devoted to burning trimmings and other wood refuse from the Great Southern Lumber Company. This refuse, carried from the saw mill to the paper mill by means of a belt conveyor at the rate of 425 tons per 24 hours, is dumped by the conveyor into the fuel bins, and re-distributed from this point by means of chain conveyors directly to the furnaces.

One 1000 hp. boiler, operating at a steam pressure of 150 lb., uses as fuel bark conveyed by both belt and chain conveyors from the two barking drums.

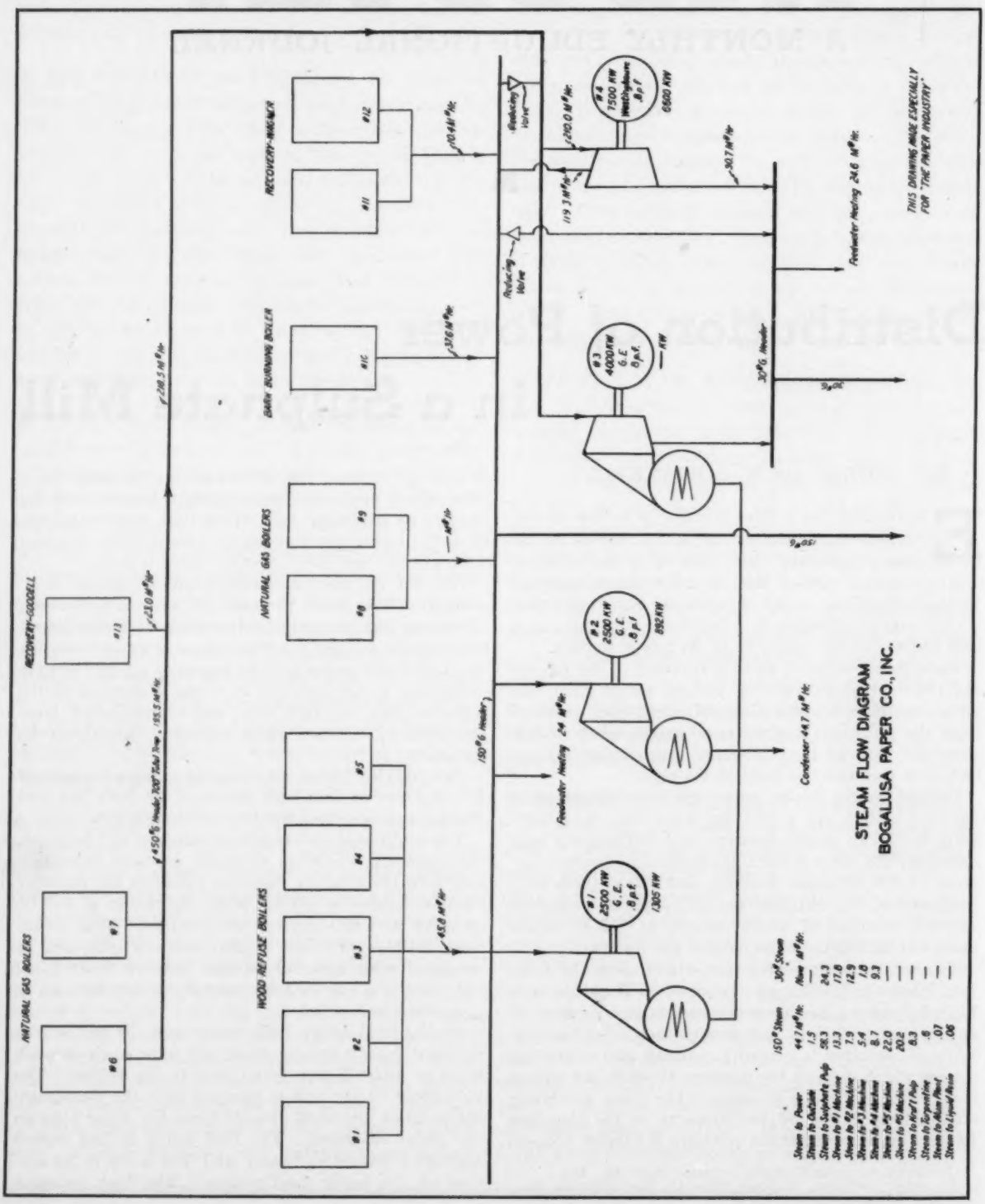
Two additional boilers with a rating of 416 hp. each, and operating at 150 lb. pressure, are used in connection with black liquor furnaces. Also in the recovery room is located a 750 hp. boiler operating at 450 lb. pressure and 650 degrees temperature. This boiler, used mainly for black liquor recovery purposes, is equipped with both forced and induced draft fans; but when it is not used for recovery it may be used as a gas-fired boiler.

Of the total boiler feed water used, 70 per cent is obtained from a nearby creek and is pumped through a set of filters before being used in the boilers. The remaining 30 per cent is pumped from the condensate tanks which are filled directly from the dryer rolls on the paper machines. The feed water is first passed through a deaerating heater, and then is fed to the suction of the boiler feed pumps. The high pressure

(1) Chief Operating Engineer, Bogalusa Paper Co., Inc.
(2) Chief Draftsman, Bogalusa Paper Co., Inc., Bogalusa, La.

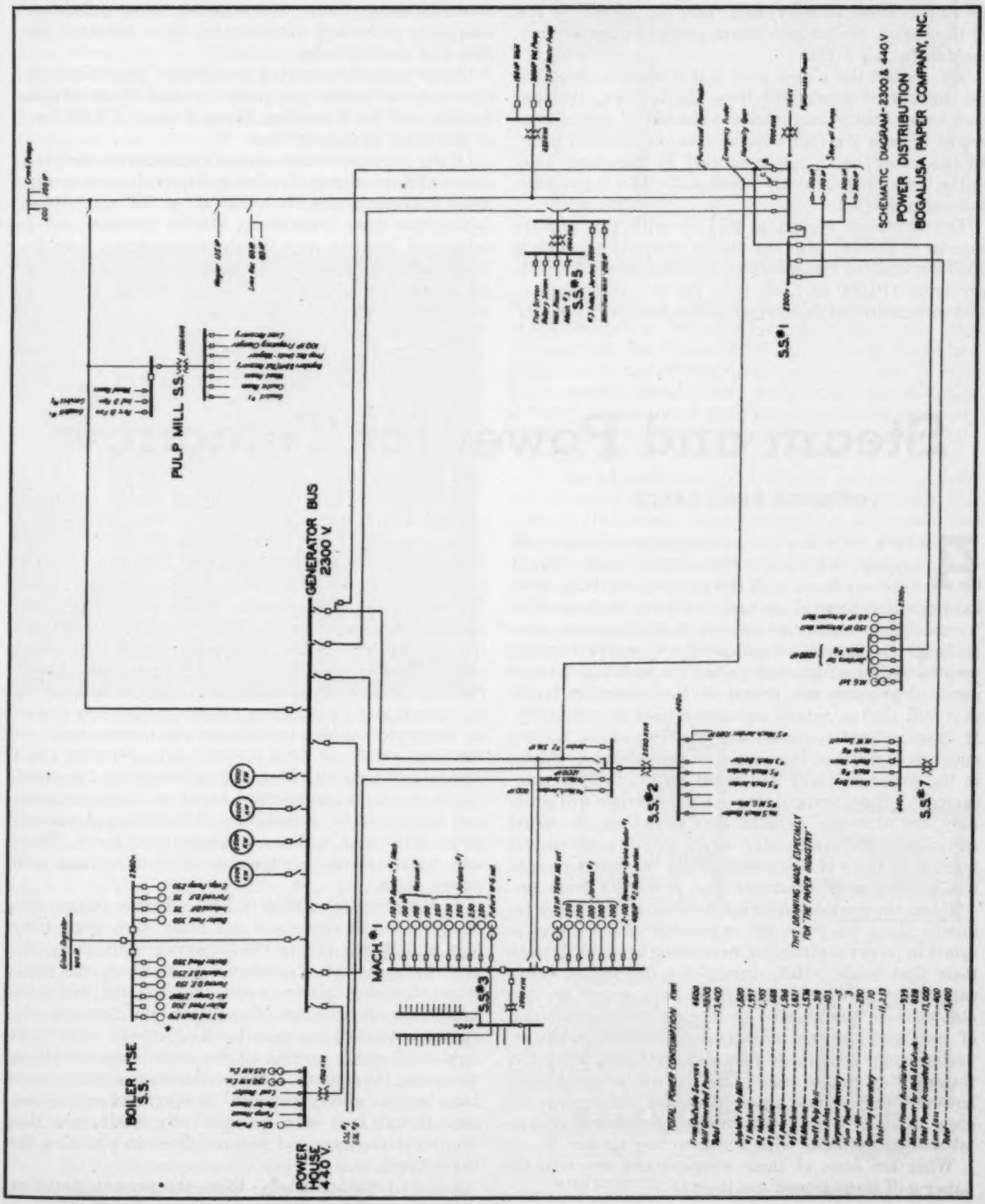
pumps force the water through two closed heaters, from which point it enters the boilers at a pressure of 600 lb. per square inch and a temperature of 340 degrees Fahr. The feed water used by the 150-lb. boilers is fed from a storage tank under the deaerating heater to the boilers at a pressure of 200 lb. per square inch and a temperature of 212 degrees Fahr. The high pressure boiler feed pump group is composed of four units, two being rated at 600 gallons per minute, each driven by a 350 hp. motor; and two 300 gallon per minute pumps, each powered by a 235 hp. turbine.

The electrical generating equipment consists of four turbo-generators, one rated at 7500 kw., two at 2500 kw., and one at 4000 kw. each. The 7500-kw. unit is designed to bleed a maximum of 226,000 lb. of steam per hour into the 150-lb. header, and the exhausting end



of the turbine is designed to pass a maximum of 100,000 lb. per hour into the 25 lb. header. It is equipped with both exhaust and bleeder pressure regulators, by means of which arrangement an increase in the demand for 25 lb. steam reduces the pressure in the exhaust. In turn, the regulating system causes the grid valve to open and thus passes more steam to the low pressure section. To counteract the resultant 150 lb. pressure drop, the bleeder regulation system then cuts in and opens the main inlet valve, admitting more steam to the unit.

The steam and electrical loads of the plant neither vary nor agree with one another except in a general way. When the electrical load exceeds the amount of power generated by the steam that may be passed through the 7500-kw. unit, the two 2500-kw. condensing



turbines and electricity from an outside source are used to make up the deficiency. The 2500-kw. turbo-generators receive steam from either of two sources; from the 150 lb. boilers, or from steam extracted from the 7500-kw. turbine. In the event that the 150-lb. process steam load drops off on the 7500-kw. unit, the deficiency in electrical generation may be made up by passing steam from the 150-lb. header through the two 2500-kw. turbines. By the use of reducing valves from the 450-lb. to the 150-lb. header, and from the 150-lb. to the 25-lb. header, the process steam pressure may be kept constant at all loads.

The use of the closed feed water heaters increases the amount of steam bled from the 7500-kw. turbine, and, consequently, increases the amount of power generated at very low fuel consumption per kilowatt hour. In this case, the energy generated by the steam bled to the heater requires only about 4500 B.t.u.'s per kilowatt hour in fuel.

The electrical system is tied in with two outside sources of power: with the utility company through a 7500-kw. bank of transformers, stepping down the voltage from 110,000 to 2,300 volts for mill distribution; and with the Great Southern Lumber Company's power plant. All four turbo-generators, the utility company, and the Great Southern Lumber Company's power plant are connected to the main 2300 volt bus in the turbine room. From this main bus, 2300 volt distribution lines are connected to the individual substations where the power is transformed from 2300 to 440 volts. Most of the large motors in the plant operate on 2300 volts. The power factor throughout the entire system is kept as near unity as possible by the use of synchronous motor loads. All main switching points are equipped with high interrupting type breakers enclosed in steel cubicles.

Under normal operating conditions, approximately 4600 kw. of power per hour is used from outside sources, and the remaining power, a total of 8,800 kw., is generated by the turbines.

Of the six paper machines, only one has an electrical drive, the remaining five being driven by steam turbines varying in size from 250 hp. to 750 hp. Steam is fed into these turbines at 150 lb. pressure and is exhausted directly into the dryer headers. Any deficiency in the steam from this source is corrected by admitting steam into the dryers from the 25-lb. exhaust header from the turbine room.

Steam and Power for Tomorrow

CHESTER REED EARLE

AFTER six years of starvation maintenance and rapidly mounting obsolescence, many paper mills are faced with the necessity of doing some hard thinking about steam and power for the immediate future. For, unless all present indications are misleading, the natural demands of a powerful nation, such as ours, that has just passed through a great economic depression are bound to overcome the forces that still tend to retard our march back to prosperity. If those natural economic and social demands become much stronger than they are now, production problems in the paper industry will merit all the skill of management. Since costs of wages and materials will probably not decrease greatly and since various social movements may indirectly affect profit margins, reduction of costs of steam and power for making paper will be even more important than it was six years ago.

When the depression struck hardest at the paper industry about six years ago, a number of new developments in power engineering were being brought through their first trials. But, during the depression, when capital for new equipment was hard to obtain and obsolescence was allowed to increase far beyond that of normal years, no industry could afford much experimenting with those new developments, attractive though they might seem. In the immediate future, however, they should prove powerful weapons in the great battle of costs versus profits, assuming that capital will be available with which to buy them.

What are some of these weapons and how can the paper mill management use them?

Most of them have been discussed by the author in the pages of THE PAPER INDUSTRY during the past few years, particularly in such articles as "Power Plant Remodeling Pays," in November, 1932, and "Management Looks at Power Costs," in September, 1933. Those articles called attention to a number of developments in equipment and methods that were just becoming available when the depression reached its worst point. Such developments included improved types of fuel burning equipment; types of steam generating equipment and piping made possible by new metals and by improved welding techniques; improvements in extraction cycles and back pressure arrangements aided by new and improved heaters, evaporators and accumulators; a continuous upward trend in steam pressures and temperatures; possibilities of balancing steam and power loads with various combinations of steam, Diesel and hydro-electric equipment; interconnections and power pools.

In the years from 1929 to 1931 all these things were being discussed vigorously and many were being tried here and there. But in the following years there was very little new plant construction and only the minimum of modernization, hence they did not find wide application for a time. In the interim, however, the manufacturers of equipment and a very few utility and industrial plants carried on the work of consolidating the gains. As a result, many of the above developments have been so solidly grounded in operating experience, even though it is on a comparatively small scale, that the power engineer can now use them in planning for the future.

Let us consider briefly, then, the present status of

those developments, after which we can form some opinion of how they will enable the paper mill to meet tomorrow's steam and power demands at low cost.

So far as fuel is concerned, coal is still king. And, as a result of experience gained during the depression, we have equipment available that will burn coal of almost any type. The old controversy between stokers and pulverized fuel is a dead issue. Either type of equipment can now be obtained for burning available coal with economy. For example, low grade Iowa coal has been burned on underfeed stokers. Also, in burning pulverized coal, the slag-tap furnace has been improved so that the bugbear of low-temperature-fusing ash is gone. Some plants have oil and gas available for fuel as well as coal, and, for those who desire it, burners have been devised in which all three fuels can be burned, thus permitting adjustment to variations in fuel prices. Water cooling of stoker tuyeres has aided in burning coals with low-temperature-fusing ash.

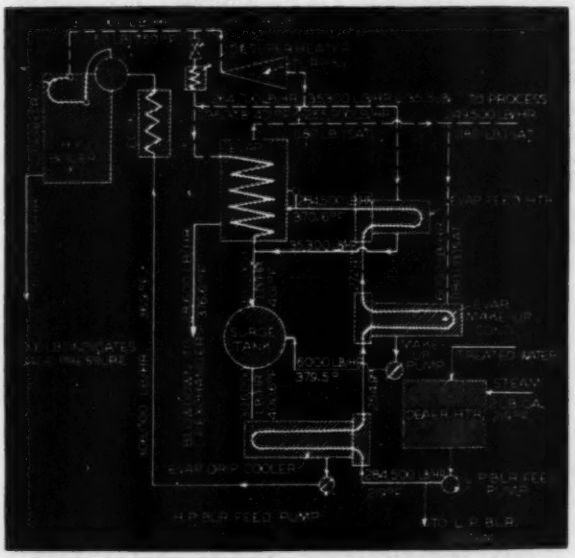


Fig. 1—In this modern plant, excellent for industrial process needs, an evaporator supplies process steam

Preheated air can be used successfully with either pulverized coal or stokers although the allowable maximum temperature must be a little lower for stokers. Furnace walls can range in construction all the way from solid or air-cooled refractory construction to completely water-cooled, radiant superheaters, including many combinations of these types, to meet almost any operating conditions.

In the field of the steam generator or boiler itself, the developments of the past few years have been toward simplification and toward steam generation at higher pressures and temperatures, both movements closely allied with development of new metals and welding techniques that have in turn made the other developments possible. Recent industrial installations have used pressures of 1400 lb. per square inch. Steam temperatures of 850 to 950 deg. probably would be favored today for a new utility plant, but, for a paper mill plant, the upper temperature limit, as well as the pressure, would depend on the ratio of power to process heat. The fact remains, however, that if the conditions demanded such high temperatures and pressures, the piping, accessories and prime movers could be supplied for them.

Practical treatment of boiler feed water has been brought to the point where serious trouble crops up

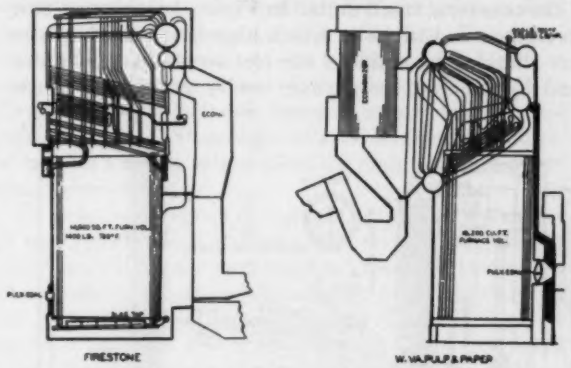


Fig. 2—Two large modern industrial steam generating units

only infrequently. Modern water treatment, however, is not confined to the boiler feed water but it also takes into account the possibility of corrosion of steam and water piping and of deposits on turbine blades. In some high pressure installations, such as the one shown in Figure 1, a heat transformer supplies process steam and permits the boiler feed water to flow in a closed circuit, uncontaminated.

In the physical design of steam generators, tube arrangements have been simplified and circulation difficulties eliminated. Modernization of old plants has been leading designers to a more flexible arrangement of tubes and drums to meet space and capacity requirements. For such service and for some of the smaller and medium-sized installations, the factory-built integral boiler and furnace seem to be growing in popularity. In any program involving the installation of increased steam generating capacity in the space and headroom left after removal of old boilers, the water-cooled fur-

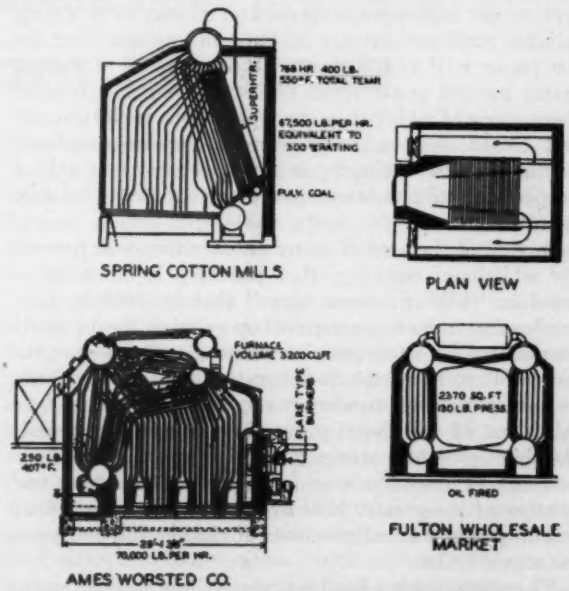


Fig. 3—Small industrial boilers of modern design

nace wall as an increaser of steaming capacity, besides its use in improving furnace conditions has proved very effective.

Two recent types of steam generating units installed in industrial plants are shown in Figure 2, while Figure 3 shows several small units. In Figure 4 is shown a unit developed in Europe in which high heat transfer rates are obtained by artificial circulation of the feed water and by keeping the furnace under positive pressure.

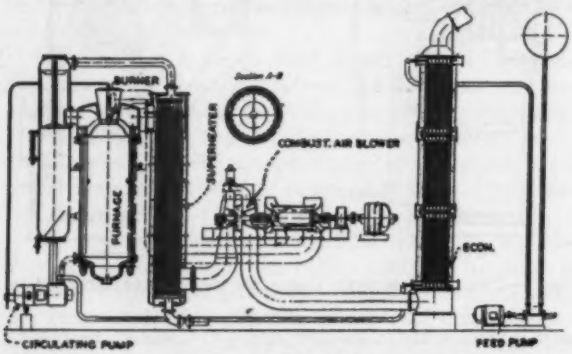


Fig. 4—The internal combustion boiler, a recent European type, designed for very high heat transfer

More than 30 such units have been installed in various parts of the world but none in this country. They have been made for capacities as high as 70,000 lb. of steam an hour and for high pressures and temperatures. One of the principal advantages claimed for them, as shown in Figure 5, is their compactness for a given output. In this unit, the furnace gases drive a gas turbine which in turn drives a turbo-compressor supplying combustion air to the furnace; the gases exhausted by the turbine pass through an economizer. In view of the success claimed for this internal-combustion boiler abroad, the writer believes that it deserves mention here.

When we turn to the developments of the past few years in prime movers, we find that we now have available a wide variety to meet future needs. The steam turbine for high temperatures and pressures is a very reliable machine and can be built in any size that fits the paper mill heat balance. It is difficult to discuss prime movers apart from the extraction and process steam cycle of which they are a part. But with the open and closed heaters, evaporators, desuperheaters and regulators now available, it is not difficult to obtain a proper heat balance, accompanied by extremely reliable operation.

In view of the need of many public utilities at present for additional capacity, that industry is much interested in "high pressure tops;" that is, 1400-lb. noncondensing units superimposed on existing low-pressure plants. Such a superposition raises the efficiency of the entire plant, increases its generating capacity, does not require additional condenser capacity and uses only a minimum of additional piping and accessories, besides the high-pressure steam-generating unit. The same advantages would accrue in a paper mill plant and because of the greater heat drop and temperature drop might permit new adjustments of the heating and process steam cycles.

The steam engine has been vastly improved in recent years and should not be ignored. It can be built for high temperatures and pressures and, as has been frequently described in the technical press, can be arranged for extraction operation if desired.

The Diesel engine has been developed into a prime mover that merits much consideration in connection with steam equipment for obtaining steam and power balances. Its use for this purpose in the Singer Building in New York City has attracted the attention of industrial power engineers everywhere. To the paper mill engineer, it is of interest primarily in that connection, since his need for process steam is paramount.

One more development of the depression is the increasing interest in interconnections and interchange of power between public utilities and large industrial plants, the latter class including, of course, many paper mills. In connection with high-pressure superposition plants in paper mills, this subject has interesting potentialities. It was discussed in some detail by this author in an article "Shall Industrials and Utilities Interchange Electric Power," in the November, 1934 issue of THE PAPER INDUSTRY. Interest has been added to the discussion by the recent conference called by the President to discuss the possibility of forming a power pool in the area in which the TVA operates. Aside from that, however, it has been noted that utility operators, because of the rapid increase in power demand during the past year, have been abandoning their somewhat aloof air towards proposals for industrial interconnections.

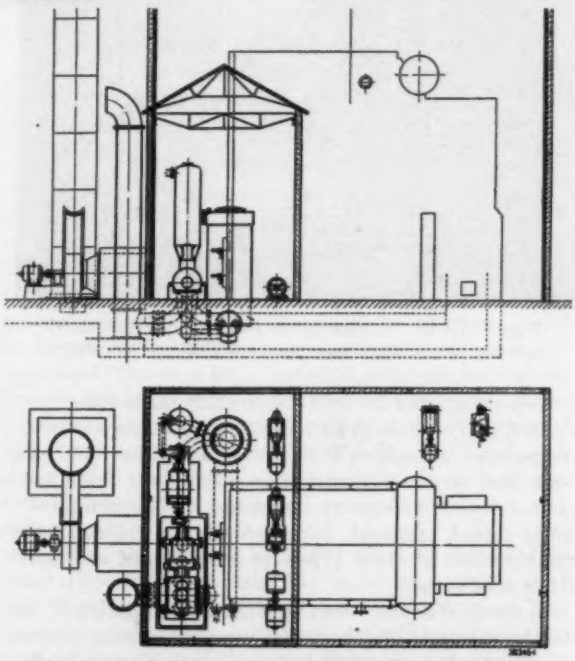


Fig. 5—Comparison of space occupied by internal combustion boiler and standard type of equal output

Now, of course, comes the question of what the paper mill management can do with all these developments to lower steam and power costs. The answer to the question depends, obviously, on the present status of the mill's power system.

If the power plant is definitely out-of-date, if maintenance is high and steam and power costs per ton of paper are always going up, the answer is clear. A new

power plant is indicated. Capital is available, good designers are to be had, the equipment is developed, and if the mill expects to make paper for the next three or four years a new plant can be designed to pay for itself in that time.

First of all, steps should be taken to see that the paper-making equipment is modernized and that the steam and power demands of that equipment are reduced to the lowest practicable point. Next, an analysis of the heat balance must be made, to determine best temperatures and pressures to meet the process requirements. Then should come a study of the fuels available, not neglecting, of course, the energy from water power that may be at hand.

In connection with studies of fuel supply, the proposals of a well-known paper mill engineer to design paper mills to operate without purchasing fuel or power have aroused much interest. These ideas are developed around a nucleus that paper mill management sometimes neglects. That nucleus is this: In thinking about reducing costs of steam and power, begin with the production equipment. It often happens that surprising economies can be effected there, sometimes greater than those possible in the generation of steam and power.

Using that principle, the proposal is made to improve the efficiency of evaporation of sulphate and sulphite liquor, to improve reactions in digesters, to improve efficiency of pulp washing, to reclaim heat from various condensates and to reduce heat consumption in drying and the like. At the same time, the treatment of the liquor will result in the production of a substance that can be burned as fuel and that will contain all the energy needed to produce the steam and power required for the more efficient processes.

At any rate, after the management has in hand enough data on its steam and power requirements and its available fuels, a new power plant can be designed. For this plant, operating temperatures and pressures should be taken high enough to secure the advantages of compactness and economy—low fixed charges and operating charges—that result when the most modern technique is used consistent with reliability. The analysis should take account of the possible need for more capacity in the future and of any changes that may be foreseen in the balance between steam and electric power demands. Possibility of an interchange arrangement with a utility might affect the design of such a new plant.

In case the analysis of today's plant with reference to tomorrow's needs indicates that much of the present plant is still in good operating condition but with high obsolescence, then the equipment for a good remodeling job is at hand. Possibly new boilers of higher capacity could go into the space now filled by some of the old ones. Possibly existing capacity could be increased by adding water-cooled furnaces. Possibly a high-pressure "top" would give just the balance of power and process steam needed. Possibly greater reliability of operation is needed, in which case the cause of frequent breakdowns may be found, not in the major equipment itself, but in some accessory or some detail of operating method.

In any event, as stated at the beginning of this article, your demands for steam and power for making paper will not be the same tomorrow as they are today. If the equipment you now have won't meet tomorrow's demands, it will be too late then to worry about it. The time to think about it is today.

Illustrations used in this article through the courtesy of *Power Plant Engineering*.

Thermal and Mechanical Advantages of Modern Steam Engines

F. J. VONACHEN
Troy Engine & Machine Co.

FOR best plant heat balance and economy, the *same* steam should be made to do double duty—it should generate power and it should heat. If the *amount* of power and heat produced are both just sufficient for the plant requirements, there is a perfect heat balance.

The steam can be made to generate power by passing it through a modern steam engine, and as about 90 per cent of the heat originally in the steam will be available in the exhaust for heating and processing, the power developed is really a low cost by-product.

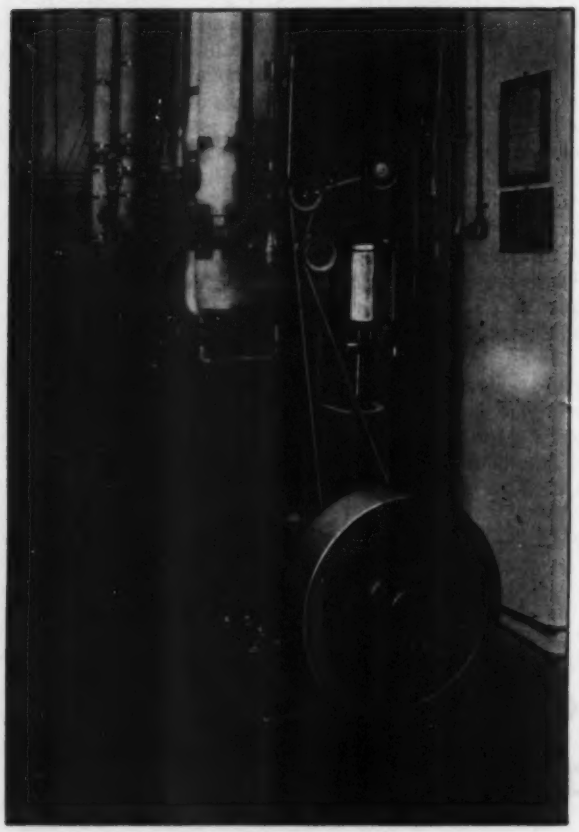
Since the low steam rate of the modern steam engine remains low throughout the entire speed range, and even at high back pressure which is sometimes necessary to obtain high temperature in the process, the amount of exhaust best meets the requirements of the average plant and a good plant heat balance results. As this low water rate is closely maintained throughout the long life of the steam engine, the original plant heat balance is also maintained which is quite important if greatest saving is to be maintained during the life of the equipment.

Since some processes require steam free from cylinder oil, it is well to mention that many steam engines are being operated entirely satisfactorily today with saturated steam without oil cylinder lubrication. With the cylinder properly constructed and glazed by the use of beeswax and graphite, it may be operated without any lubrication except possibly the introduction of a slight amount of beeswax and graphite at infrequent intervals. A solution of colloidal graphite in distilled water, introduced into the cylinder by a special mechanical cylinder lubricator, also has been used with success. The graphite concentration is so low that it does not interfere with processing even if the steam comes in direct contact

with the process and its effect on boiler operation is considered advantageous.

Steam conditions offer no particular problem as the modern steam engines are suitable for a wide range of conditions—from 20 to 400 pounds pressure, from very wet steam to 750 deg. Fahr. total temperature, from vacuum to 75 pounds and higher back pressure. There is no limit to the amount of back pressure, if there is sufficient initial steam pressure to produce the required power within the limits of practical cylinder bores.

Some plants may be running their boilers at very low pressure and using the steam only for heating and processing. These boilers usually will produce steam



Engine driving stoker

at a sufficiently high pressure to operate a steam engine at only very slightly higher cost since most of the heat generated in the boiler changes water into steam and as the amount of heat necessary to raise the steam pressure is relatively small. It will be to their advantage to make this steam do double duty and to obtain the resulting low cost by-product power.

Cost of generating this by-product power consists of operating and fixed costs. Operating costs are lubrication cost and about 10 per cent of the steam cost (the other 90 per cent of the steam cost being rightfully charged to heating cost). Fixed costs based on 20-year life are: interest on investment, say six per cent; annual depreciation five per cent; annual maintenance two per cent. As a general rule, no extra operating labor is necessary with the modern steam engine. In spite of numerous items in the cost, the total is so low that steam engines usually pay for themselves in 6 to 12 months by the saving in power cost.

While it is difficult to prepare by-product power cost charts for the many conditions existing in various plants, it will be well to give a range of expected costs for both large and small engines for one particular set of average conditions. Assume the following: 150 lb. ga. steam pressure, no superheat, 5 lb. ga. back pressure, 2000 hr. operation per year with an average load 50 per cent of full load, all exhaust steam used, and steam costing 50 cents per 1000 lb. Taking into consideration all operating and fixed costs, the cost of the by-product power would range from 0.75 cents per b.hp. per hr. (1 cent per kw.-hr.) in a small 12 hp. engine, to 0.3 cent per b.hp. per hr. (0.4 cent per kw.-hr.) in a larger 225 hp. engine—extremely low power cost. (Note that these figures are based on an average load which is 50 per cent of full load. With the higher average load existing in many plants, these figures would be still lower.)

A good idea of the extremely low cost of modern steam engine by-product power also may be had from the following actual plant surveys:

Driving draft fan and stokers with an annual saving of $2523 on an investment of $1100.

This large industrial plant generates steam primarily for heating and to drive air compressors. The only requirement for the exhaust steam is in the heating system. A 7 x 8 steam engine drives a draft fan and four underfeed stokers which operate the four 400 horsepower boilers.

During the heating season (212 days) the plant heat balance is ideal as the heating load takes all the exhaust steam. In the summer months (153 non-heating days) there is an excess of exhaust steam.

This boiler room operates continuously 24 hours a day, 365 days a year, thereby imposing continuous duty upon the engine. In the five years that it has been in continuous service, only one very minor replacement (that of the governor gears) was necessary.

The officials of this plant advise that they regard the steam engine drive more reliable than other types of drive, that it provides simple automatic control of boiler operations and that its smooth automatic regulation over a wide range of speeds results in their obtaining greater over-all boiler efficiency with the consequent saving of fuel.

Details for this first survey are as follows:

Load data

Maximum hp. required	42
Average hp.	29.4
Hours operation per year—24 hr. per day x 365 days per yr. = 8760	
R.p.m. (normal)	300

Steam Data

Pressure range, lb. ga.	200
Quality	Dry
Superheat	None
Back pressure, lb. ga.	2.5
Feed water temperature, deg. Fahr.	185
Cost of steam per 1000 lb.	$0.50

First Cost

First cost of engine installed	$1100.00

Annual Fixed Charges

Depreciation—5% of $1100.00	$ 55.00
Average interest at 6%—$1100.00 x .0315	34.65
Maintenance—2% of $1100.00	22.00
Total	$ 111.65

Annual Operating Cost

Determination of useful heat in exhaust:

Engine steam consumption = 1058 lb. per hr.
Heat in live steam = 1199 B.t.u. per lb.
Heat supplied engine = 1058 x 1199 = 1,270,000 B.t.u. per hr.
Radiation loss = 2% of total = 25,400 B.t.u. per hr.
Engine mechanical efficiency = 87.3%
i.hp. = 29.4 ÷ 0.873 = 33.7
Heat equivalent of one — i.hp. = 2545 B.t.u. per hr.
Heat converted to work = 33.7 x 2545 = 86,000 B.t.u. per hr.
Heat used by engine = radiation loss + work = 25,400 + 86,000 = 111,400 B.t.u. per hr.
Heat left in exhaust = 1,270,000 — 111,400 = 1,158,600 B.t.u. per hr. = 1,158,600 ÷ 1058 = 1097 B.t.u. per lb.
Available heat in the live steam = 1199 — (185 — 32) = 1046 B.t.u. per lb.
Available heat in the exhaust = 1097 — (185 — 32) = 944 B.t.u. per lb.
Per cent useful heat left in exhaust = 944 ÷ 1046 = 90.1%
Steam cost for 212 da. heating season = 1058 x 24 x 212 x 0.099 x 0.50 ÷ 1000 = $266.00
Steam cost for 153 day non-heating season = 1058 x 24 x 153 x .50 ÷ 1000 = $1940.00
Total steam cost per year = 266 + 1940 = $2206.00
Lubrication cost per year = $37.00
Extra operating labor cost per year = none
Total operating cost per year = 2206 + 37 = $2243.00

Total Annual Cost

Total annual cost = fixed cost + operating cost = 111.65 + 2243 = $2354.65
This is equivalent to 2354.65 ÷ (29.4 x 24 x 365) = $.00915 per b.hp. per hr. or = $.0123 per kw.-hr.

If the cost of 1.23 cents per kw.-hr. as shown is compared with that of operating an electric motor under similar conditions with purchased current available at 2 cents per kw.-hr., including the demand charges, there would be a saving of $2523.00 per year, 51.7 per cent of the first cost, which would pay for the engine installation in less than 6 months and show an annual return on the investment of 229 per cent.

This particular survey is a good example of a plant that has use for exhaust during only a part of the year. If the exhaust is used the entire year, as it can be in many plants, the cost is considerably lower.

Industrial plant reduces night power and light cost $764 or 66 per cent annually with steam engine driven generator.

These people produce their own light and power at an annual saving of 66 per cent over purchased power. Three 150 hp. boilers supply steam. The 30 kw. direct current generating set receives saturated steam at 115 lb. pressure, generates 68,000 kilowatt hours annually and returns the exhaust to steam heating coils in a kiln which serves to dry molded blocks preparatory to firing. The low maintained steam rate of this generating set is responsible for proper heat balance and the low power cost.

The electrical energy generated supplies a sixteen-hour night shift power load consisting of 3 to 5 - 5 hp. kiln oil-burning motors, a 10 hp. air compressor motor, a 1 hp. electric hoist, and also the lighting system, at a cost of slightly more than ½ cent per kw.-hr. compared with the local utility rate of 1.7 cents. The annual cost is $391 as against $1,156 if the power were purchased. Thus a saving of $764 annually, yearly dividends of 29.4 per cent, on original investment.

This steam engine generating set has been in service for 5½ years, there has been no power failure, nor have any repairs or replacements been required in this time. A summary of the cost and comparison follows:

Driving draft fan

Purchased Power:

68,000 Kw. hr. @ .17 (local rate)...$1,156.00

Generated Power Cost:

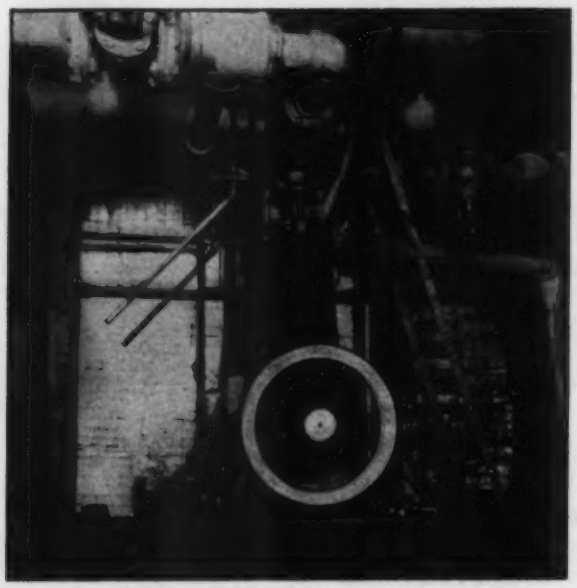
Annual fixed charges on generating set	$237.90	
Annual cost of operation	153.87	391.77
Annual Saving:		$764.23 (66%)
Return on investment		29.4%

In addition to the foregoing "thermal economy," there should be considered the question of economy

from "modernization," that is, accurate control, correct operating characteristics, reliability, and modern design and construction. That the modern steam engine has definite advantages in these respects in paper plants is clearly illustrated by the many installations recently made to drive stokers, forced and induced draft fans, pumps, generators, blowers, exhausters, ventilating fans, mixers, conveyors, balers, etc.

The modern steam engine has wide, smooth, flexible, easily adjusted speed range with infinitely small steps and is easily connected to and operated by automatic control. Whether the control is manual or automatic, definite speed is maintained for each point of control. In other words, there is good regulation and, of prime importance, no hunting. The steam engine also is quickly started as very little warming-up is required. It can be placed in service without delay.

Governors are throttling or automatic type. The throttling type of proper design and materials for the steam conditions, is used in adjustable speed service in three ways: (1) for manual control, (2) as a maximum speed stop in conjunction with automatic control, or (3) with an attachment directly connected to the automatic control, in which case the governor maintains definite engine speed for a particular setting of the control. With throttling governor, the engine is furnished with: (1) a fixed eccentric having a fixed point of cut-off, or (2) with a hand adjustable eccentric by which the cut-off can be varied when the engine is not running, or (3) with a variable eccentric by which the cut-off can be varied while the engine is running by simply turning a hand wheel. The last two devices permit setting the cut-off at the most economical point,



Duplex engine driving draft fan

thus decreasing the steam consumption approximately 10 per cent below that obtained with fixed eccentric. They also permit reversing the direction of rotation. For wide speed range this type of governor can be furnished with a V-port valve cage which makes the governor stable at very low engine speeds or very light loads with the governor valve just cracked.

The automatic or flywheel type of governor automatically adjusts the cut-off for best economy but is suitable only for constant speed service, although it can be used as a maximum speed stop in connection with automatic control in variable speed service. Its regulation is within two per cent from no load to full load.

Steam engine speed is conservative and conducive to long life. Fans, generators, rotary pumps and exhausters may be direct connected. Only small speed reduction is necessary to drive stokers, mixers, mills, balers and conveyors. Higher speed fans, blowers and driers may be driven by flat or V-belts, or chains. Its high starting and running torque and large overload capacity are desirable features for most installations.

As to reliability, the modern heavy duty steam engine is of rugged construction, has been continuously improved and is fully enclosed, self-oiling and oil-tight so it is quite common to have months of continuous service at full load. An example is a recent record still run made at the Kendall Refining Company where a modern steam engine drove a side cut pump 24 hours per day for 168 days continuously.

While no radical changes have been made in the basic design of the steam engine as years of service have proved its soundness, the design has been greatly refined by taking full advantage of high grade modern materials now available and by careful refinement of each part from the standpoint of actual field requirements.

This refinement has made the modern steam engine simple, foolproof and reliable. It has practically eliminated attention by the operator and when attention is required, it has given him every convenience so that adjustments and operations can be carried out quickly and efficiently. It has brought substantial reduction in steam and oil costs. It has placed the "modern" steam engine head and shoulders above the older designs and has given to industry an unusually effective, low cost, proven drive for many types of equipment.

In modern steam engines, all parts of the cylinder, steam chest, piston, and valve in contact with the steam are alloy iron. The cylinders are detachable from the engine frames and fitted with American Standard flanged pipe connections. Recent cylinder and valve re-design has greatly improved the previously good economy.

The piston type of valve is perfectly balanced as it is entirely surrounded by the steam and is generally used for fairly dry, superheated, or high pressure steam. It should operate in a replaceable, ground valve chamber bushing with accurately milled ports. This makes it unnecessary to rebore the valve chamber as a new bushing can be installed readily. This feature also maintains the original water rate. When furnished with rings, the valve should have two narrow rings at each end to eliminate difficulty with wear of ring grooves.

The flat type of valve is suitable for very wet steam as it automatically lifts off its seat to relieve the cylinder of excess condensation without disturbing valve stem alignment. It is practically balanced, should have accurately machined port edges, very light weight to reduce friction and wear, and be ground to its seat under pressure. A balancing ring held against the steam chest cover by a flat spring will eliminate steam

pressure from a portion of the back of the valve. The live steam pressure against the remainder of the back of the valve will keep the valve stem tight and automatically adjust for wear.

The engine crosshead should be fitted with adjustable bronze shoes grooved for proper oil distribution. The connecting rod should have a wide bearing at the lower end fitted with a removable babbitt bushing with laminated shim adjustment while the upper end should be fitted with a bronze box with wedge adjustment.

The frame should be fitted through machined surfaces with large panels or doors and hand hole plates,

Engines driving forced and induced draft fans

so these can be removed easily and quickly for inspection purposes. These surfaces should be grooved to prevent creepage of oil by surface tension or provided with gaskets. Aluminum panels in the larger engines facilitate handling. Oil throws which overlap gutters on the panels will eliminate oil-leakage along the crankshaft thus removing a serious difficulty experienced with older designs.

Bearings should be babbitt or high grade bronze, all easily adjusted by laminated shims or other simple adjustment. They should have generous adjustment range to permit years of service without replacement. Main bearings should be removable without removing the shaft and all others have renewable bushings easily replaced if necessary by interchangeable spares.

The lubricating system should be designed from the standpoint of convenience, reliability of operation and low oil consumption. The engine base should contain an oil reservoir, separator and automatic water drain and slope toward a large drain plug, so that it can be easily flushed out and cleaned. The separator and water drain will automatically and continually separate and discharge from the base into an outside drain any condensate that may accumulate.

The oil pump, located in the oil reservoir, should have a straight plunger driven from the crosshead, and ball check valves, and should deliver oil into a distributing oil box on the side of the engine frame. The distributing box should be provided with adjustable sight feeds for all bearings, and made of aluminum to give a permanent light-colored background against which the oil feeds are readily visible.

A new type of watershed partition between the cylinder and crank case, is one of the most important recent improvements made in vertical engines. There is sufficient space between the watershed and cylinder so no part of the piston rod which runs below the watershed enters the piston rod stuffing box. This prevents bearing lubricating oil from entering the cylinder, a requirement of vital importance for operation without cylinder lubrication and of value in preventing loss of oil. The watershed partition is so trapped and drained that no bearing oil finds its way to the top of the watershed, eliminating another frequent source of oil loss.

Piston rod and valve stem stuffing boxes are trapped to drain condensate and cylinder oil to the top of the watershed. The watershed is in turn trapped to collect condensate and cylinder oil from the piston rod. A drain on the side of the engine frame removes this condensate and cylinder oil. An excellent feature of this new watershed design is that no part of the piston rod comes in contact with the watershed thereby eliminating wear and the action of wear on the proper functioning of the equipment.

Engines built to these specifications will be modern in every respect.

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Effect of Bleaching on Sulphate Fibers

TESTS at the National Bureau of Standards have shown that the strength and durability of sulphate fibers may be seriously affected in bleaching them if the correct pulping and bleaching processes are not used.

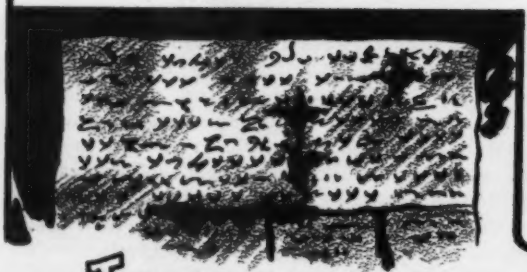
The sulphate pulping process, in which the chemicals used are a mixture of sodium sulphide and caustic soda, was formerly used only for the production of the strong, durable "kraft" fibers used for wrapping, sheathing and other purposes where high strength and durability are required. They were formerly unbleached but in order to obtain a lighter color for some purposes, they are now sometimes partially bleached by the usual hypochlorite process. On applying the accelerated aging test used at the bureau, heating at 100 deg. C. for 72 hours, it was found that papers made from such fibers retained as little as 6 per cent of their original folding endurance, while papers made of unbleached fibers retained as much as 70 per cent of their folding endurance. Also, the former had much less initial folding endurance. Strangely enough, when the former papers were tested according to the standard analytical procedure, in some cases the presence of unbleached sulphite fibers and of bleached fibers and of various mixtures of these with kraft (unbleached sulphate fibers) was indicated.

The sulphate pulping process has now come into use for making white papers of great strength and endurance, and these are quite a different story. Modified pulping and bleaching processes permit the production of bleached fibers having a high degree of stability. The heat test applied to some papers made from such fibers showed folding endurance retention of 85 per cent or better.

Paper Sketches ---

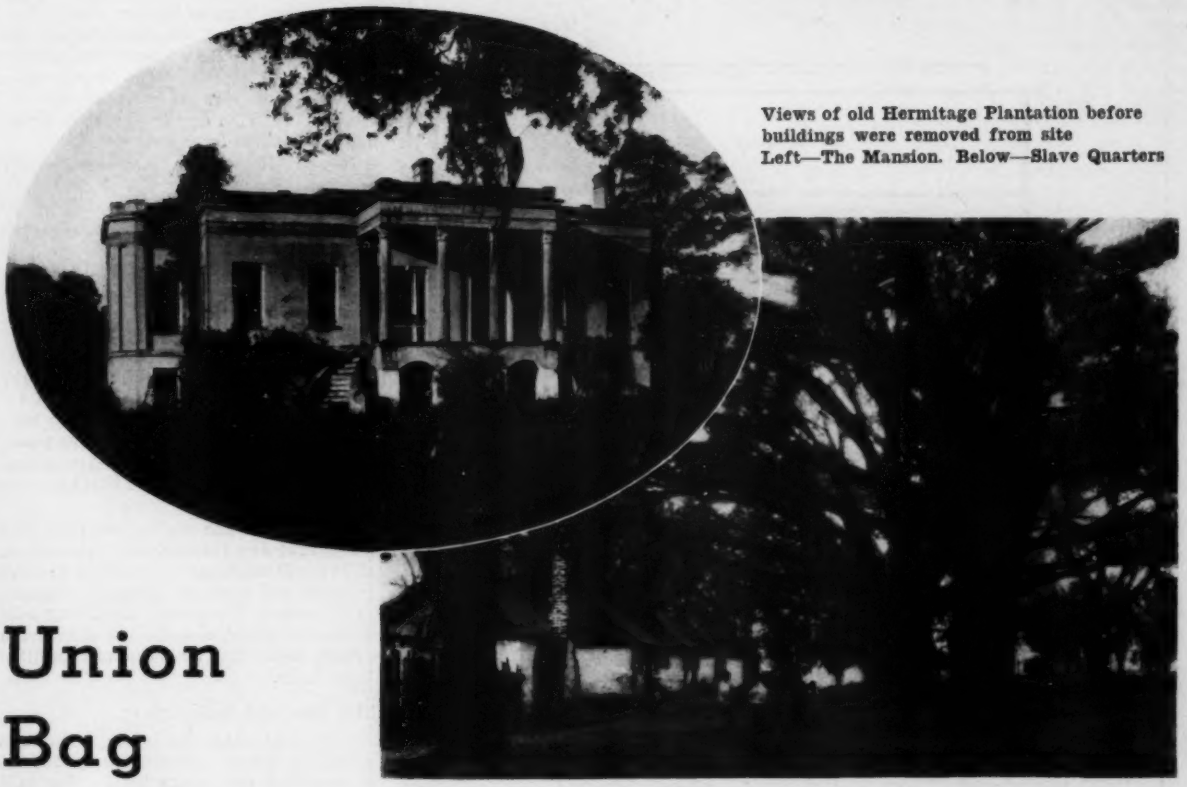
NATHAN SELLERS, APPARENTLY THE ONLY MAKER OF PAPER MOULDS IN THE U. S. DURING THE REVOLUTION, IN JOINING THE CONTINENTAL ARMY, CAUSED MEMBERS OF THE TRADE TO PETITION CONGRESS TO ORDER HIM HOME SO THAT HE MIGHT "MAKE AND PREPARE SUITABLE MOULDS, WASHERS AND UTENSILS FOR CARRYING ON THE PAPER MANUFACTORY."

REFORESTATION WAS PUT INTO OPERATION BY PAPERMAKERS OF THE UNITED STATES BEFORE LUMBER MANUFACTURERS TOOK CORRESPONDING ACTION.



THE EARLIEST SAMPLES OF TRUE RAG PAPER KNOWN TO EXIST, ARE THE NINE SOGDIAN LETTERS, ENCLOSED IN ENVELOPES, FOUND IN 1907 BY SIR AUREL STEIN IN A RUINED SPUR OF CHINA'S GREAT WALL. THESE LETTERS ARE SAID TO DATE FROM ABOUT 150 A. D.

APPROXIMATELY 23,519 TONS OF PAPER WERE USED IN THE PRINTING OF THE 1936 FALL AND WINTER CATALOGS ISSUED BY SEARS, ROEBUCK & CO., AND MONTGOMERY, WARD & CO.



Views of old Hermitage Plantation before buildings were removed from site
Left—The Mansion. Below—Slave Quarters

Union Bag Builds on Site of Old Plantation

HARRY E. WESTON

ON the site of one of the South's most historic plantations has been erected a modern sulphate pulp and paper plant.

The site is about three miles northwest of the city of Savannah, Ga., on the west bank of the Savannah River.

The plantation, known as "The Hermitage," was founded there by the McAlpin family nearly two hundred years ago or very shortly after James Edward Oglethorpe with his small band of colonists had established themselves in Savannah.

The new mill is that of the Union Bag and Paper Corporation.

In looking back into the past it is easy to visualize the transformation of the undeveloped area into something of beauty and productiveness. Climate, soil and market conditions incident to the development of a new country offered the opportunity. Vision and work became the tools to bring about the change.

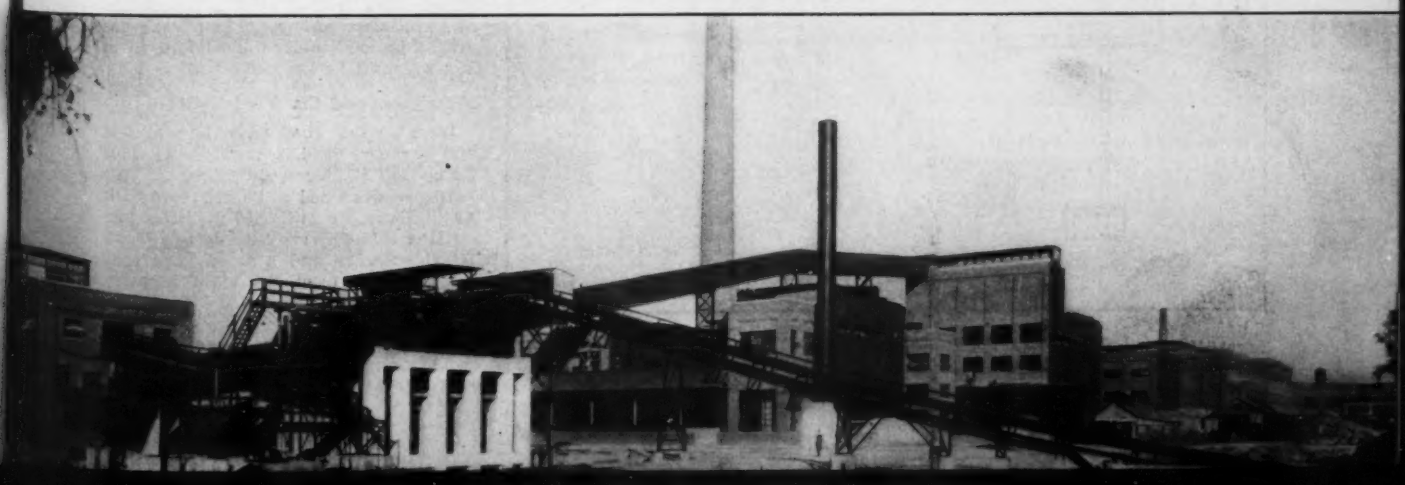
Down through the years each succeeding generation no doubt played its part in making of the plantation the show place it became.

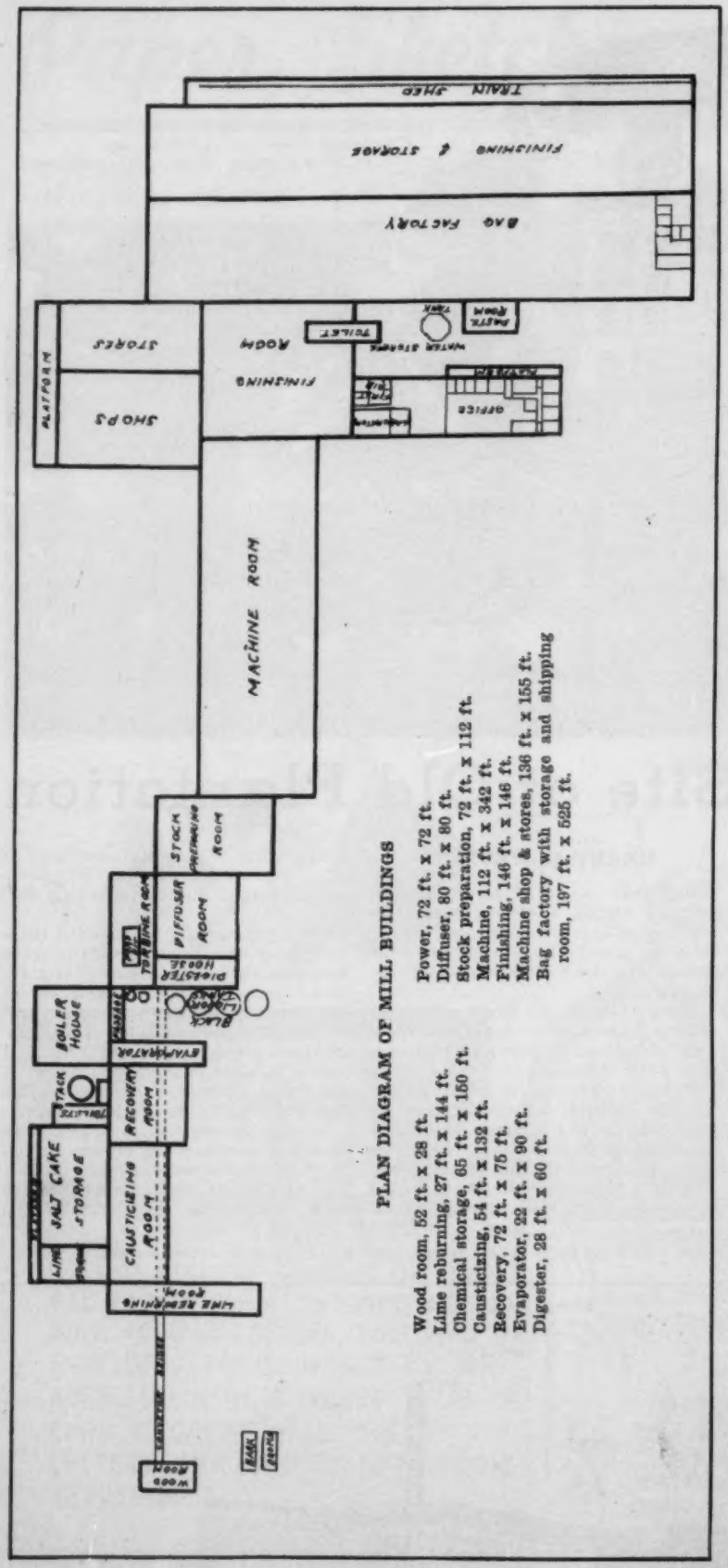
Picture an evening on the plantation with its beautiful colonial mansion, its slave huts, its live oak trees with Spanish moss hanging like fancy lace from their branches and with a full moon shining brightly over the placid waters of the broad Savannah. Then contrast such a scene of complete restfulness or of a gay, social evening, whichever comes to mind, with that of a busy daytime.

What pleasure and satisfaction there must have been in those days to those fortunate enough to absorb even a little of the beauty and the grandeur of the place; but "time marches on." Changes in the economic life of the country take place. Plantation life as it once was is no more. Nevertheless, it has left a heritage in song and story that will permit it to live for all time.

So "The Hermitage" as it used to be is only a memory; and yet some of its physical attributes continue to live. The mansion, the plantation kitchen, the slave huts and the hospital have been

General view of mill. Barking drums and wood room in left foreground. Bag factory at extreme right





PLAN DIAGRAM OF MILL BUILDINGS

Wood room, 52 ft. x 28 ft.
Lime reburning, 27 ft. x 144 ft.
Chemical storage, 65 ft. x 150 ft.
Causticizing, 54 ft. x 132 ft.
Recovery, 72 ft. x 75 ft.
Evaporator, 22 ft. x 90 ft.
Digester, 28 ft. x 60 ft.

Power, 72 ft. x 72 ft.
Diffuser, 80 ft. x 80 ft.
Stock preparation, 72 ft. x 112 ft.
Machine, 112 ft. x 342 ft.
Finishing, 146 ft. x 146 ft.
Machine shop & stores, 136 ft. x 155 ft.
Bag factory with storage and shipping room, 197 ft. x 525 ft.

preserved. They were purchased only a few years ago by Henry Ford, after D. W. Griffith had recreated on the old plantation the life of the "Old South" in his film classic, "The Birth of a Nation," and now they stand on Mr. Ford's plantation on the Ogeechee River, about fifteen miles below Savannah.

Rows of live oaks now venerable with age, still line both sides of the old roadway which extended for a distance of perhaps a quarter of a mile from the main highway into the mansion. So long ago were they planted, that they have literally joined hands with one another in fellowship. The branches of each tree extend into the branches of those immediately adjacent to it in the row as well as with those across the road. The result is an archway of exquisite beauty which in no way has been injured by construction of the new plant.

It is around this treasured remnant of The Hermitage that the mill has been built.

The mill is the first of at least two units that are planned for the project. It alone is designed for a daily production of 135 tons or more of sulphate pulp, and 125 tons of kraft bag and wrapping paper, and for the conversion of this paper into as many as 12 million bags daily.

Mill Site and Buildings

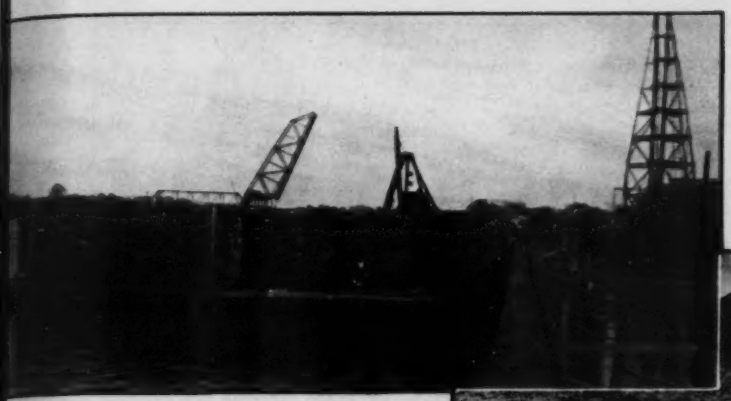
The mill site comprises about 375 acres, of which approximately 250,000 square feet are taken up by the mill buildings. These buildings include a wood room, lime reburning room, chemical storage room, causticizing room, recovery room, evaporator room, digester house, power plant, diffuser room, stock preparation building, machine room, finishing room, machine shop and stores building, and bag factory with storage and shipping room in addition to the office building and time office. The wood room and time office are each housed in separated buildings, while the other buildings are erected as an integrated structure.

For the most part the buildings are of reinforced concrete, brick and steel construction. Steel sash are used for the windows; poured-in-gypsum and cement deck slabs for the roofs. The roof slabs are covered with built-up felt that is pitched and graveled.

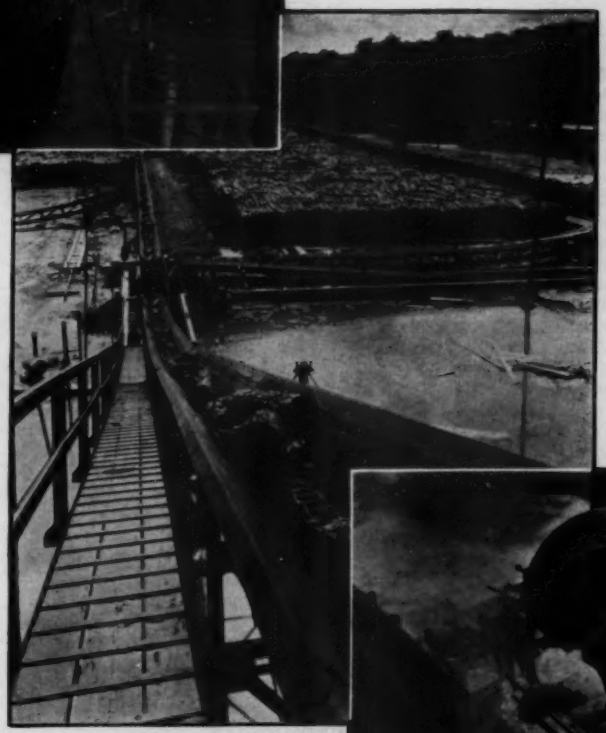
The sizes of the individual mill buildings proper, and their relative locations, are shown in the accompanying diagram. All of the buildings, arranged parallel and adjacent to the Savannah River, were erected upon a foundation of hard clay. About 1000 piles, however, were used under the machine room and some of the heavier structures.

Arrangement of the Wood Yard

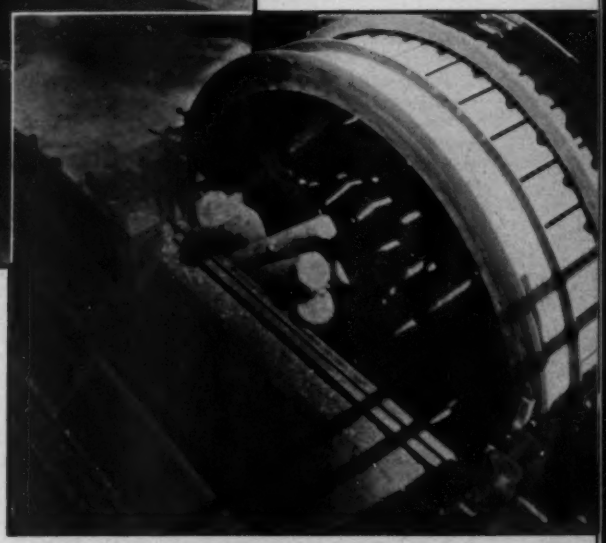
Close to the wood room is a graded and surfaced yard, approximately 1000 ft. by 300 ft., for wood storage. This yard permits wood to be delivered to it by highway, or rail. Its facilities permitting this delivery include two parallel side tracks and a wood yard road extending in from the main highway fronting the property.



Above—Barge of pulpwood ready for unloading



Left—Wood yard showing arrangement of conveyors



Below—Discharge end of one of the barking drums

A system of Stephens-Adamson conveyors permits the delivery of this wood to two 10 ft. by 30 ft. American barking drums.

This system of conveyors includes two portable yard conveyors, two main conveyors, one transfer conveyor, and an inclined conveyor. The portable yard conveyors are each 74 ft. 6 in. long and operate at right angles to the main conveyors. One of these traveling cross conveyors serves one main conveyor, while the other serves the second.

The main conveyors, as is the case of the portable conveyors, are horizontal in design. One of them is 409 ft. long. The other is 400 ft. long. These conveyors receive their wood either from the portable conveyors, or from cars or trucks direct.

The transfer conveyor delivers the wood from one of the main conveyors to the inclined conveyor which in turn conveys the wood direct to the barking drums. This transfer conveyor is 100 ft. long.

Wood from the second main conveyor discharges directly to the inclined conveyor.

The inclined conveyor is 164 ft. long and has a 36 ft. rise.

Another conveyor, likewise with a 36 ft. rise, a combination horizontal and inclined unit, delivers wood from barges directly to the barking drums. This latter conveyor is 300 ft. long.

Each of these wood handling conveyors utilizes a U-shaped steel trough in the bottom of which is a channel section with the channel side up to take the wear of the loaded chain above it. The chain runs in the trough formed by the channel. Steel framework supports the trough and the framework in turn is supported by a foundation of concrete piling set level with the surface of the ground.

These conveyors have a capacity of approximately 30 cords per hour and are designed to operate at a speed of about 125 ft. per minute.

The two American barking drums are installed parallel to one another.

Each drum is suspended in four six-inch pitch alloy steel chains and driven by a separate chain. The suspension chains run over chilled rim traction wheels in spring take-ups which absorb heavy shocks.

The drum shells, built of hot rolled U-bars of selected steel, are electrically welded —the U-bars being welded to heavy ship channel rings.

The barked wood from the barking drums is conveyed by an inclined drag chain conveyor to the wood room. This conveyor is 84 ft. long and has a 13 ft. rise.

Several other drag chain conveyors are used to handle the wood refuse. Two of them are of horizontal design and are each 58 ft. long. These units feed an inclined conveyor that is 104 ft. long and which has a 11 ft. rise.

All of these conveyors, as well as the conveyors within the wood room for handling the wood in process and for transporting the chips to chip storage, are of Stephens-Adamson design.

The Wood Room

The major equipment of the wood room includes one chipper, two screens, and one crusher.

The chipper is an 88-in. Carthage unit, which is connected directly to a 200-hp. E. M. synchronous motor.

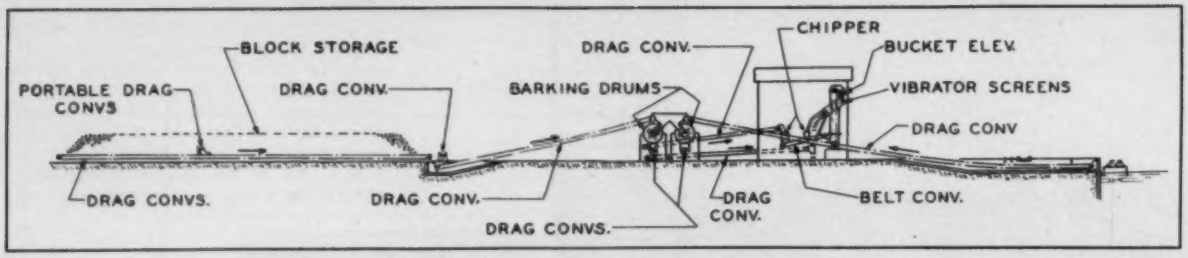
The entire wearing surface of the disc of this chipper is covered with easily renewable wear resistance plates. Safety rings make it easy to set all knives alike. An outer ring prevents the escape of wood strands that might become slivers and forces them to be cut into more suitable length of chip.

The base of the chipper, designed to absorb shock and to minimize transmission of vibration to the direct connected motor, is in two separate parts. The front base weighs 8000 lb. and spreads over a relatively large area.

The motor is located outside the back bearing so that the stator can be slid back for repairs or the rotor can be pulled off the end of the shaft.

Anti-friction bearings for thrust and radial load prevent hammering of the shaft endwise and up and down. The anti-friction thrust bearing, which takes thrust in both directions, is on the front side. It ties the disc and the bed knife to one block of iron, a feature designed to minimize spring and to make for rigidity. The disc is adjusted through a series of sleeves and jam nuts around the thrust bolt.

The knives, held in position through



Elevation diagram of wood conveyor system

the uses of four bolts and without cheek pieces, are tilted back of the radial line. This arrangement causes the wood to be pushed toward the outside of the spout throughout the entire cut, thus keeping the wood steadier than if the cut pushed out at first and then hooked in.

The chipper and motor jointly are installed on a concrete base that is free from the side walls and operating floor of the wood room building.

All of the chips produced by the chipper are elevated and discharged upon two W. S. Tyler Niagara, 4 ft. by 12 ft., vibrating screens. These screens are located side by side and are arranged so that they face the back side of the chipper. Oversize rejects, discharged by these units, drop by gravity in a common chute to a 36-in. Lombard crusher. Sawdust discharged from the screens joins the bark refuse removed from the wood by the barking drums.

The crushed chips from the Lombard crusher drop by gravity upon the chip conveyor that is handling the chips from the chipper to the chip screens. In this way, they are returned to the chip screens for another screening.

Chip Handling and Storage

A structural steel inclined bridge extends from the side of the wood room nearest the rest of the plant over the lime reburning room, the causticizing room, the recovery room, and the evaporator room to the top of the digester house. This bridge is covered, and within this structure and supported by the bridge are two belt conveyors.

One of these conveyors is 480 ft. long. It is equipped with a 30 in. five-ply U. S. Rubber Company rubber belt which conveys the selected chips from the wood room to the digester bin. The other conveyor, utilizing another rubber belt of the same make, carries bark, sawdust and refuse to the power house. This second conveyor, 24 in. wide and 394 ft. long, is located directly beneath the chip belt.

As the chips reach the chip loft they are discharged upon a cross conveyor that extends the full length of the chip bin and which permits the chips to be dropped into the bin at any point along its entire length. This conveyor equipped with a third U. S. Rubber Company rubber belt, ejects the chips from the belt by means of a simple deflector and thus they drop through a grilled opening into the bin.

Other than for this grilled opening, the chip loft is covered completely with a concrete floor. Several steel ladders, placed at convenient points along the grilling, serve as the only means of entering the bin. This construction makes it practically impossible for any one to fall into the bin accidentally and allows for the easy handling of all chips.

The bin is U-shaped and is of plate steel construction. The bottom of the bin is only a few feet above the top of the digesters, and the chip discharge openings in it are so located that a hopper, moved along on a tramrail to any opening, easily connects the opening with its respective digester.

At several critical points along the walls of the bin provision has been made to break down any arching of chips that might occur within it through the use of steam.

Digesters and Diffusers

The digester installation consists of four M. W. Kellogg 2700 cubic feet fusion welded digesters. These digesters are insulated and are arranged for both direct and indirect cooking. The indirect cooking arrangement includes one F. M. P. heat exchanger and one F. M. P. circulating pump for each digester. With this arrangement, liquor is drawn out from the upper part of a digester through a circular strainer and pumped through a 2-pass heat exchanger back to the bottom and the dome of the digester. Condensate from the exchanger is returned to boilers.

Stainless steel tubes and tube sheets are used in the exchangers.

Facilities for automatically controlling the cooking cycle also are provided. With this control, the cooking of a digester charge is started with 30 lb. steam and finished with 135 lb. steam. Manual operation is reduced to pushing a starting button at the beginning and another at the finish of a cook. The switchover in pressures as well as the air relief from the charge is accomplished through the use on each digester of a Dubl-Duty Unit System Fulscope recording temperature controller with pressure recorder combined, two Evenaction diaphragm valves for the high and low pressure steam supply, and one Evenaction diaphragm valve for digester pressure release. In addition, there is auxiliary equipment consisting of air valves, chambers and switches, as well as two Fulscope indicating pressure controllers for the steam supply lines, one for the low pressure line and the other for the high.

The temperature recording controller brings up the temperature with the 35 lb. steam supply, and keeps the relief valve open until temperature of charge reaches boiling point, when it closes the valve and it remains closed during the rest of the cook. When the temperature within the charge reaches the highest point possible with the 35 lb. steam, the 135 lb. steam is turned on automatically and the low pressure cut off.

Steam, relieved during the cooking operation, is led through coils inside cooking liquor measuring tanks. These tanks are located on the operating floor of the digester building directly behind the digester tops.

The use of the relieved steam in this manner aids in maintaining as high a temperature as possible in the cooking liquor.

Diffusers are used for pulp washing.

The installation consists of twelve M. W. Kellogg 3,000 cubic feet fusion welded units which are arranged around a circular concrete dump chest. These diffuser units, as in case of the digesters, are insulated; while the dump chest is provided with vertical agitators.

The blow system, which discharges the stock from the digesters into the diffusers, includes a central trap to receive the digester blow steam. This blow-off steam is led to a jet condenser and accumulator. Contaminated condensate from the blow-off steam retained in the accumulator is put through two spiral heat exchangers. Cold water entering them absorbs the heat and provides clean heated water for stock washing and other uses. The jet condenser accumulator and heat exchanger arrangement is known as the Rosenblad system.

The condensate from the indirect heaters is carried to a flash tank for return as boiler feed. Automatic alkalinity protective devices, however, are installed to divert it, should liquor enter the lines because of leaky tubes or from any other cause.

Filtration and Concentration of Black Liquor

The first step in the recovery operations is that of filtering the black liquor, a Malone black liquor filter being used for the purpose.

This filter, designed to handle from 250,000 to 300,000 gallons of black liquor daily, collects such pulp as might be contained in the liquor. The fiber is retained on the outside surface of a slowly revolving cylinder mold with a wire cloth surface, while the liquor passes to the inside. A spray on the inside ejects the fiber from the wire just above a couch board which guides it to a receiving board.

Only a one-half horsepower motor is required to operate the machine.

The filtered black liquor passes to storage. Three 70,000-gallon tanks are provided to retain it. These tanks are of plate steel construction and are located just outside and parallel to one wall of the digester house.

The concentration of this liquor to about 55 per cent total solids is accomplished in a Swenson long-tube vertical, film type, quadruple effect evaporator of welded steel construction. This evaporator has five bodies—one body in each of the last three effects and two bodies in the first effect. Each of these units is provided with a centrifugal type separator.

The liquor piping and pump arrangement is such that the liquor is fed into the last effect of the evaporator and progresses through in complete reverse direction to the flow of steam, the flow of liquor through the evaporator being controlled only by operation of a feed valve on the last effect in accordance with the density discharged from the first effect.

A Schutte & Koerting barometric multiple jet type condenser precipitates the vapors in the last effect.

The condensate from the first effect is returned to the boilers—that from the other effects to a sump pit where it is combined with digester blow down condensate overflow from the accumulator. Gases vented off this pit are piped to one of three B & W-Tomlinson recovery units where they are consumed, thus minimizing the obnoxious odors usually common to sulphate pulp mills.

Recovery Plant Boilers

Each of the recovery units, consisting of a B & W waste heat boiler with superheater, economizer and air heater, the boiler rated at 342 hp. being set over a Bailey water-cooled recovery furnace, is designed for a capacity equivalent to 67½ tons of air-dry pulp per day on a basis of 3000 lb. of solids in the liquor per ton of pulp. With a total plant capacity of 135 tons of pulp per day, this load can be taken on two of the units, leaving the third unit as a spare.

The three units are equipped with oil burners as well as with automatic spray nozzles for black liquor feed. This arrangement permits the independent use of either fuel, or both of them may be burned simultaneously. A blending tank for each furnace permits measured quantities of make-up salt cake to be added to the concentrated black liquor that is being fed to it. The feeding is accomplished by pumping from the blend tank to the spray nozzle in the furnace.

Bailey automatic combustion control and draft regulation is provided for these furnaces. The equipment installed for that purpose includes a boiler meter, an air-operated control drive, a steam flow meter, a recorder and a Type PGF multi-pointer gauge for each furnace.

The boiler meter indicates, records and integrates black liquor flow to the furnace; records total air supplied for combustion; and records spray nozzle supply pressure.

The orifice for black liquor measurement is installed in the supply line to the blending tank. This position was selected to avoid difficulty from suspended salt cake which exists in the line from the blending tank to the spray nozzle. An arrangement of steam heating separating chambers keeps the liquor out of the flow mechanism and thus permits the use of a standard meter.

The level of liquor in the blend tank is held constant automatically through a flow operated valve.

The air flow supplied a furnace is measured by using the pressure drop across an orifice placed in a duct provided at the forced draft fan inlet. Since the forced draft fan is run at constant speed, control of the air supply is effected by connecting the air-operated control drive to the louvre dampers in the forced draft duct. The control drive may be operated manually from the selector valve on the control panel from which point any adjustment may be made to maintain the air supply in correct ratio to the black liquor flow to the furnace.

The steam flow meter, which measures the steam produced by the unit, is equipped to also record flue gas temperature and air temperature. A record of steam temperature is provided by the recorder; while forced draft, furnace draft, differential through boiler, differential through air heater, induced draft fan inlet, and black liquor storage level are indicated by the multi-pointer gauge, Type P. G. F.

Expected performance of the recovery units contem-

Above—Chip screens and chip crusher

Above—
The chip conveyor

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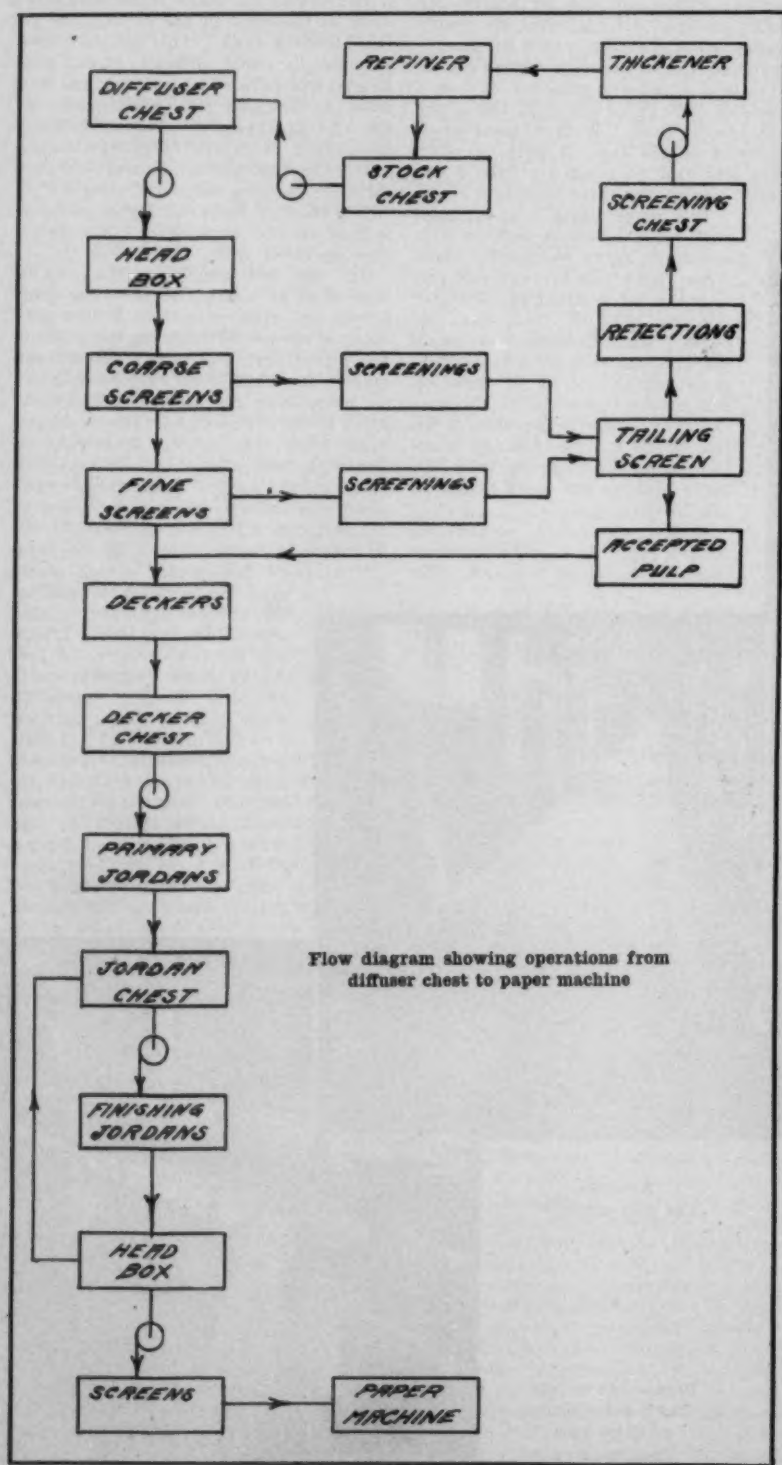
Right — Chip loft showing discharge of chips into floor opening

plates chemical reduction of 95 per cent and a production of 12,000 lb. of steam at 430 lb. pressure, 750 deg. Fahr., per ton of pulp.

Smelt from the furnaces is delivered into dissolving tanks located directly under the operating floor of the furnace room. Specially constructed spouts are used to convey the smelt from the furnaces to the tanks.

Continuous Causticizing System

The green liquor is treated in a Dorr continuous causticizing system, designed to produce strong white cooking liquor sufficient for cooking 135 tons of sulphate pulp per 24 hours, at 100 cu. ft. of liquor per ton of pulp and approximately 7 lb. of total alkali per cu. ft. of liquor.



Flow diagram showing operations from diffuser chest to paper machine

The system includes equipment for clear green liquor production and dregs washing, lime handling, slaking and causticizing, white liquor production and lime mud washing, and lime mud dewatering and reburning.

Gravity clarification of the green liquor as delivered from the dissolving tanks is accomplished in a four-compartment, 20 ft. diameter by 22 ft. deep, clarifying thickener. The settled dregs are pumped to a 20 ft. by 25 ft., four-compartment, washing thickener with the compartments arranged in series to give the dregs four washing steps. A continuous stream of fresh hot water enters the lowest compartment and emerges at the top as weak green liquor. This liquor joins weak white liquor in storage to be used in the dissolving tanks.

The washed dregs are pumped to waste.

Fresh lime is conveyed from storage to a fresh lime bin by means of a Jeffrey bucket elevator. A bin for re-burned lime duplicates the fresh lime bin. This bin is furnished by a Jeffrey scraper conveyor and bucket elevator with re-burned lime from a re-burning kiln. A screen rejects oversize material, lumps 1 inch or over.

Each bin, designated for approximate ly 20 tons storage capacity, is 11 ft. diameter by 12 ft. high on the straight side. Bottoms are conical.

Two Ross chain feeders, separately motored, with Reeves vari-speed pulleys, deliver fresh and re-burned lime in metered quantities (about 150 lb. of fresh lime and 350 lb. of re-burned lime per ton of pulp) to an extra heavy screw conveyor, separately motored, which feeds the lime into a 4 ft. by 19 ft. Kilby rotary lime slaker. The slaked lime, lumps ½ inch or over being rejected by a rotary scalping screen, is ejected from the end opposite the feed.

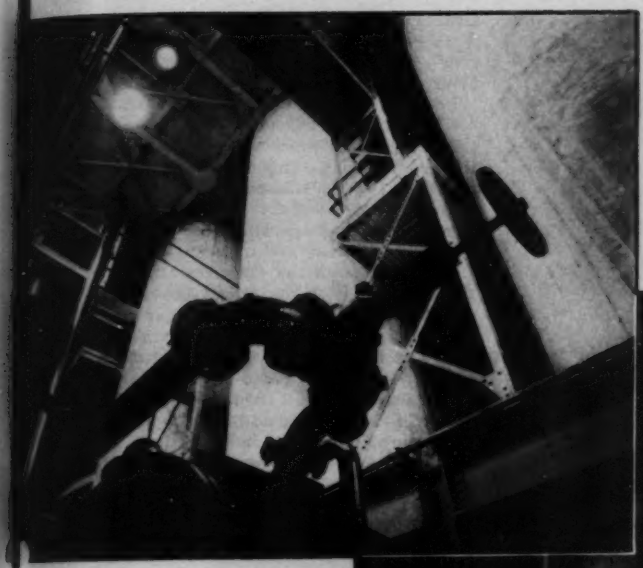
The slaked lime enters a bowl classifier where settleable impurities are removed, the impurities being washed with a spray of hot water as they are raked up the inclined body of the classifier to salvage all lime and solubles.

Clarified green liquor is used for lime slaking. A part of it is piped into the feed end of the slaker, a portion into the slaker's discharge screen to keep the feed chute of the classifier clear, and some of it is fed into the classifier body. A connection also is provided for green liquor feed to the causticizers.

The classifier has nominal dimensions of 18 in. by 18 ft. by 4 ft. bowl diameter. Its bowl launder discharges a cleaned slaked lime suspension in green liquor, which is pumped to the causticizers.

The causticizers, three of them, are set in series to minimize liquid by-passing. The layout of piping, however, is such that any one causticizer may be by-passed for repairs.

Each of the causticizers is hung in a tank with dished bottom and flat top with a vent pipe to the roof. The tank size is 7 ft. 6 in. diameter by 6 ft. deep.



Below—Diffusers and diffuser pit installation

Below—Rotary kiln for lime re-burning

Above—View of digesters

The slurry of liquor and lime carbonate from the causticizers flows by gravity to the first of two continuous clarifying thickeners.

This thickener is 20 ft. diameter by 14 ft. deep, and is of the three-compartment balanced type. Its interior mechanism is mounted upon a vertical shaft which is driven by a worm gear assembled carried on a ball bearing unit with a ball race approximately 4 ft. in diameter. An overload alarm and motor cut-out device provides protection against accidental or operating overloads.

The lime mud is withdrawn continuously from the thickener's underflow cone by a diaphragm pump with an adjustable length stroke to assure volumetric delivery commensurate with the rate of deposition of the lime mud.

The second thickener, a duplicate of the first, receives the lime mud from the first unit, mixed with weak liquor filtrate and fresh hot water as a wash. It likewise functions exactly as the first unit except that it overflows weak white liquor to storage and discharges its mud to a sump where it is mixed with weak filtrate from an Oliver rotary drum filter to which the mud is delivered after being pumped by a sludge pump to a repulper.

The repulper is a Turbo-Mixer unit installed in a 4 ft. diameter by 4 ft. deep steel tank.

Dilution of the mud at this point with hot water serves as a preliminary wash.

Final washing and mechanical dewatering of the lime mud is accomplished on the filter, the drum being 6 ft. in diameter and 3 ft. long. This drum is of cast iron, as is the removable screen, filter valve, and tank. The tank is equipped with an oscillating agitator, the drum with a Monel metal wire cloth cover. A Nash vacuum pump provides the vacuum.

The filter cake, washed upon the filter by a hot water spray, is ejected at about 45 per cent moisture content into a screw conveyor that delivers it to a Vulcan rotary lime kiln.

Lime Kiln

This kiln has a diameter of 8 ft. and a length of 120 ft. The shell, electrically welded, is made of long sheets with outside reinforcing bands at points of greatest stress. Tires are of open hearth cast steel as is the girth gear which is meshed with a pinion mounted on the slow speed shaft of a Falk herringbone speed reducer. The high speed shaft of the reducer is connected to a motor through a Texrope drive.

Self-lubricating single roller bearings, where two rollers are under each tire, support the kiln. Thrust bearings support bevel face rollers which operate with a bevel sided tire.

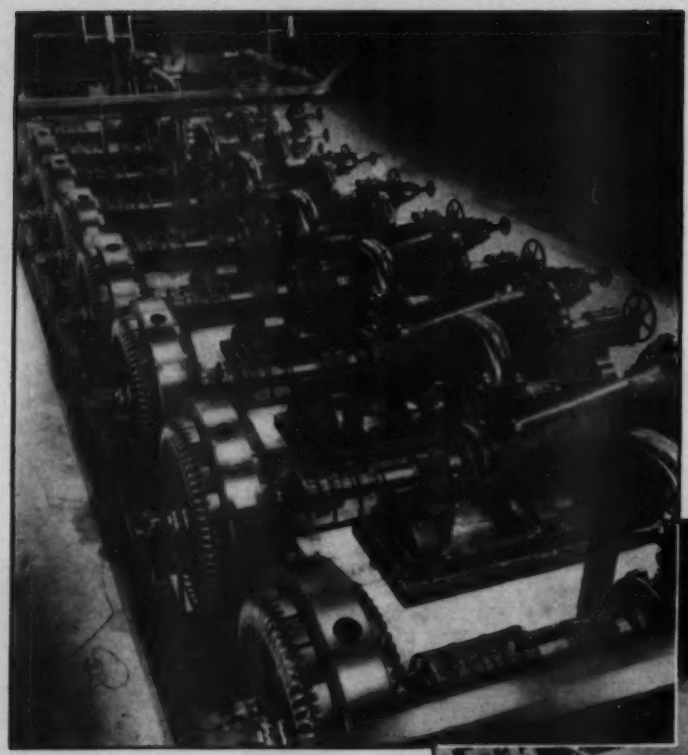
Gear guards cover the gear ring and main pinion.

This kiln, designed to produce approximately 1½ tons of calcium oxide per hour, is heated with a Hauck venturi high pressure atomizing steam fuel oil burner. This burner is supplemented by a Hauck micro increment dial type oil valve and a steel jacketed refractory ignition tile, the oil valve permitting a smooth, uniformly graduated control of oil to burner, and the ignition tile maintaining ignition after lighting of burner and facilitating regulation and lighting.

A steam cleaning connection is provided on the burner. This connection makes it possible to clean the entire burner and the oil regulating valve without any dismantling. A Quigley Company refractory lining completes the kiln. Operating temperatures within the kiln approximate the following:

	Deg. Fahr.
Inlet	480
Flame	2900
Lime (10 ft. from discharge)	2800
Lime (at discharge)	2600

The re-burned lime, produced in this kiln, is conveyed to the bin to which reference has already been made, thus completing the cycle of liquor preparation and recovery.



Above—Jordan line showing piping arrangement, motors and coupling connections

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Right—Close-up of wire under high speed operation

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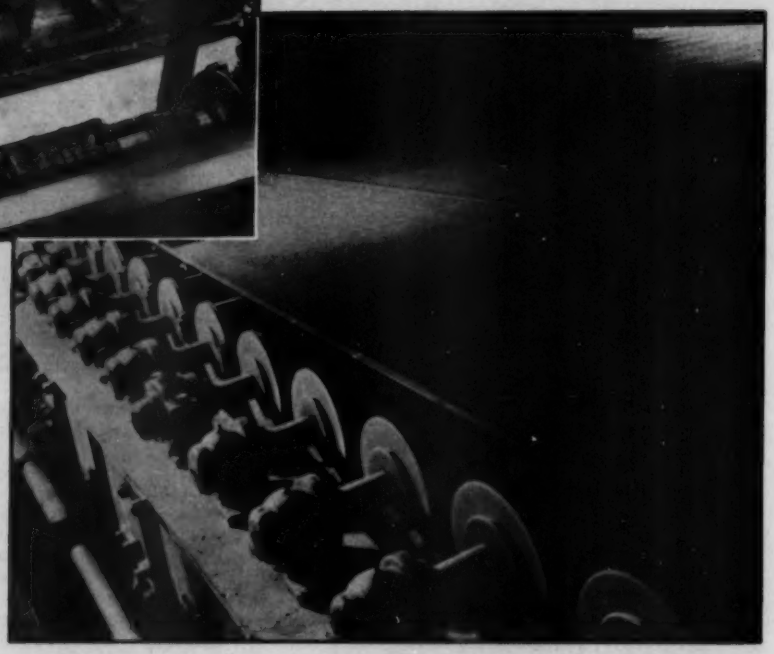


gravity into the decker chest from which it is pumped to seven Jones Majestic type jordans for primary treatment prior to delivery in the jordan chest.

Each of these jordans is driven by a 350 hp. G. E. synchronous motor as are three additional units of the same kind which are used as finishing jordans and to which the stock is pumped from the jordan chest and delivered to them at about 3 per cent consistency.

The ten jordans are arranged side by side in a row on the main floor of the stock preparation building, the same floor which contains the knotters, screens and thickeners.

The stock from the finishing jordans goes direct to the paper machine over four Jones screens. Overflow from the screen installation head box is returned to the jordan chest for recirculation.

Both size and alum are added to the stock continuously. The size is added just ahead of the finishing jordans, and the alum at mixing pump ahead of paper machine.

Stock Preparation

The handling of the pulp stock from the diffuser chest through the remaining operations of the pulp mill and its conversion into paper is illustrated graphically in the accompanying flow diagram.

The diffuser chest stock is elevated to a head box from which it flows through three standard Impco knotters.

Each of these knotters is equipped with plates having round perforations one-half inch in diameter and with a separate motor driven reducer. The actual power required is less than 1 hp. per machine.

The accepted stock from the knotters discharges into a flume which distributes it to three Impco design No. 4 centrifugal screens. Each screen is equipped with a 40-hp. motor and a V-belt drive and with plates with .125-in. round perforations.

A fourth Impco design No. 4 centrifugal screen, equipped with a 25-hp. motor, handles the screenings from the knotters as well as from the fine screens, the rejections from this screen going to a screening chest, thence to a 36 in. by 85 in. wood vat Impco slusher type thickener, and the thickened stock in turn to a Bauer refiner from which it passes into a stock chest previous to being pumped back into the diffuser chest where it enters the screening cycle again.

The accepted stock from the fine screens as well as from the tailing screen flows by gravity to two, 8 ft. diameter by 8 ft. length of face, Impco vacuum thickeners. White water from the paper machine is used for shower purposes on these thickeners, and, in this way, the machines serve both as deckers and as save-alls.

Stock discharged from the thickeners at about 4 per cent density drops by

Paper Machine Wet End

The paper machine, a Pusey-Jones fourdrinier, has a flow box of streamlined design that is constructed with structural steel supporting framework, stainless clad steel ends and cypress bottom and partitions. The flow box is equipped with a motor driven distributor roll, adjustable baffles and a quick acting dump valve.

A motor-driven distributor roll also is used in connection with a Voith inlet. This inlet is 60 in. high.

The fourdrinier part, arranged for a wire 234 in. wide and 90 ft. long, utilizes a brass breast roll, a 40-in. Beloit suction couch roll, an Aldrich shake and removable fourdrinier, and seven suction boxes in addition to its table and wire return rolls. The suction boxes

are equipped with a motor-driven oscillating device which provides each box with a combined crosswise and endwise movement. Table rolls are of rubber-covered steel tubing, are 10½ in. in diameter, and are equipped with water deflectors. Wire return rolls are cased in Monel.

The table rolls and breast rolls are equipped with Timken bearings. All other roll bearings of the fourdrinier part are S. K. F.

The press part is arranged with two 34-in. diameter bronze shell suction press rolls in combination with rubber covered upper press rolls. The part also includes rubber-covered steel tube felt rolls; motor operated basement felt stretchers; automatic and hand adjusted felt guides; a 20 in. diameter Downingtown suction roll for each felt; and brass tube paper carrying rolls. Each of the press housings likewise is equipped with a motor lift for the upper roll and with a quick releasing pressure device.

Messinger bearings are used on the main suction press rolls; while the paper and felt carrying rolls, felt suction rolls, and top press rolls are equipped with S. K. F. bearings.

Dry End of Paper Machine

The drying section consists of a 42-in. diameter receiving dryer, forty-three 60-in. diameter main drying cylinders, and six 48-in. diameter felt dryers.

A smoothing and marking press divides the dryer section into two parts. This press, located midway of the section, consists of two 32-in. diameter rolls, the lower rubber covered, the upper bronzed cased. These rolls are equipped with roller bearings. A motor-operated upper roll lift and a drive for the upper roll, likewise, are provided.

Other features of the dryer section include a Ross fireproof, panel-type hood, an automatic motor operated felt tension adjuster for each of the four dryer felts. Sheahan rope feed for threading the sheet through the dryers and smoothing press; oilless pressure sealing type steam joints; totally enclosed dryer gearing; and Bowser pressure feed lubricating system for main dryer bearings and enclosed gearing.

The hood is arranged with wide overhang and deep curtains. Four fans located on a mezzanine floor above the drive at the rear of the machine remove the vapor from it. This vapor is discharged through stacks to the air.

All drying cylinders, gearing and felt rolls are equipped with S. K. F. roller bearings. The front side dryer bearings are mounted to permit expansion and contraction of the drying cylinders without excessive thrust of the bearings or dryer frames.

The main steam supply to the dryers is controlled by means of a Foxboro temperature regulator, while condensate and air within the dryers are removed with a type "S" Fulton drainage system.

The dryers, divided into several sections, are supplied with steam at the dry end. This steam passes through the several sections in a manner that creates and maintains a definite and positive pressure drop between sections in the direction of flow. Flash steam is utilized and applied to assist in producing graduated temperatures on the wet end dryers.

A condensate pumping unit, having a hot condensate pump and an air pump mounted on the same base and direct-connected to one motor, returns the condensate to boiler plant and discharges air at the pump.

Each dryer is equipped with a steam distributing nozzle, an internally supported syphon pipe, and a condensate scoop. The condensate scoop, installed on the inlet end of the syphon pipe, guides the condensate to the pipe and forms a more intimate contact with the dryer shell.

The control panel for the circulating system is located conveniently on the front side of the machine near the dry end.

The dryer section is followed with a single calender stack, uniform speed reel equipped with adjustable spreader, and with a two-drum slitter and winder.

The calender stack contains eight rolls, the bottom roll of which is 32 in. in diameter, and the upper rolls 20 in. and 16 in. These rolls are equipped with flexible ductors, motor lift and anti-friction bearings, the bearings being lubricated by the same Bowser pressure feed lubricating system that was mentioned for the main dryer bearings and for the enclosed gearing.

S. K. F. roller bearings are used on the main drum as well as on the reeling drums of the reel.

The winder drums, lead rolls and slitters of the winder are balanced for speeds up to 3,000 ft. per minute and are equipped, as is the pressure rider roll, with S. K. F. bearings.

Finished rolls are removed from the winder by means of a motor operating discharging and dumping mechanism which is incorporated with the design.

Sectionalized Electric Drive

A General Electric sectionalized electric drive, designed to operate from 300 to 1200 ft. per minute and for making kraft paper up to 100 lb. basis weight, furnishes motive power for the machine.

The motors, ten in number, are of the totally-enclosed, externally ventilated, direct current type operating on an adjustable voltage control system from a 750 kw. synchronous motor generator set. A 30 kw. direct connected exciter supplies excitation to the motors and control which is of the magnetic type. Enclosed herringbone gear units connect the motors to the indriving shafts of the sections.

The motors are started, stopped and

Dryer section. Left—note hood, walkway, bearings, lubrication fittings and frame; right—control panel of drainage system

otherwise controlled during acceleration and slow speed running of the machine through the use of individual section master controllers. These controllers, located at the front side of the machine, act through magnetic control panels mounted near the motor generator set.

Selsyn type speed regulators maintain constant draw between sections. The first dryer section is operated as a master section and the speed is regulated by means of sensitive speed regulator equipment acting upon the generator voltage to maintain speed. The first dryer section driving motors drive a pilot generator which is connected to the voltage control element and the main generator voltage is so controlled as to maintain this pilot generator voltage at a constant and, accordingly, to maintain a constant speed for the section.

The first dryer section driving motor, in addition, drives the master Selsyn generator which functions in connection with the compensated Selsyn speed regulators on the second dryer section, the smoothing press, presses, and couch.

The calender and reel sections operate without the speed regulators, their operation depending upon the characteristics of the driving motors. This arrangement permits these sections to speed up or slow down slightly as paper conditions change. The amount of pull that these sections exert on the paper is adjusted through rheostats located at the operator's control station on front side of machine.

In addition to the compensated Selsyn speed regulators, the drive utilizes flywheels on the driving motors of those sections with light inertia constants. This arrangement practically eliminates variations in draw caused by normal operating frequency and voltage variation.

The winder, geared for 3000 ft. per minute operation, is equipped with an adjustable generator voltage type drive. This drive provides for a direct-current driving motor for each drum, the motors being supplied with power from a generator of an induction motor driven MG set.

A braking generator direct-connected to reel shell and controlled through a constant current regulator permits constant tension to be maintained in the paper as it is unwound from the roll. This generator returns power to the winder motors, a booster generator connected in series with its armature aiding in doing this at low speeds and at standstill of the winder. The booster generator is driven as part of the winder MG set.

A fifteen-ton five-motor traveling crane spans the machine for servicing the machine. Other cranes are installed for handling the reel and for servicing the drive.

Located in the basement under the machine room is a Dilts continuous broke beater. This beater has a cast iron tub which is equipped with a perforated backfall, a Howell perforated bedplate extractor, and an all-steel roll. The roll is of the keyed bandless type and of braced bar construction. It is supported in double suspension spring bearings to cushion it against shock in both upward and downward direction. Bearing boxes are of the marine thrust type.

This beater, handling the broke and trimmings from the machine room above, is driven through a flat belt drive and a 60 hp. motor.

Finishing Room

The major finishing room equipment includes a Camachine Type 18 rewinder, a 124-in. Hamblet Model 29 roller bearing duplex cutter, an 84-in. Seybold knife trimmer and a Kron scale.

The rewinder provides for 122 in. trim; for rewinding rolls up to 60 in. diameter; and for slitter settings to cut widths from $5\frac{15}{16}$ in. upward.

The machine is equipped with antifriction bearings. Both Norma-Hoffman and SKF bearings are employed.

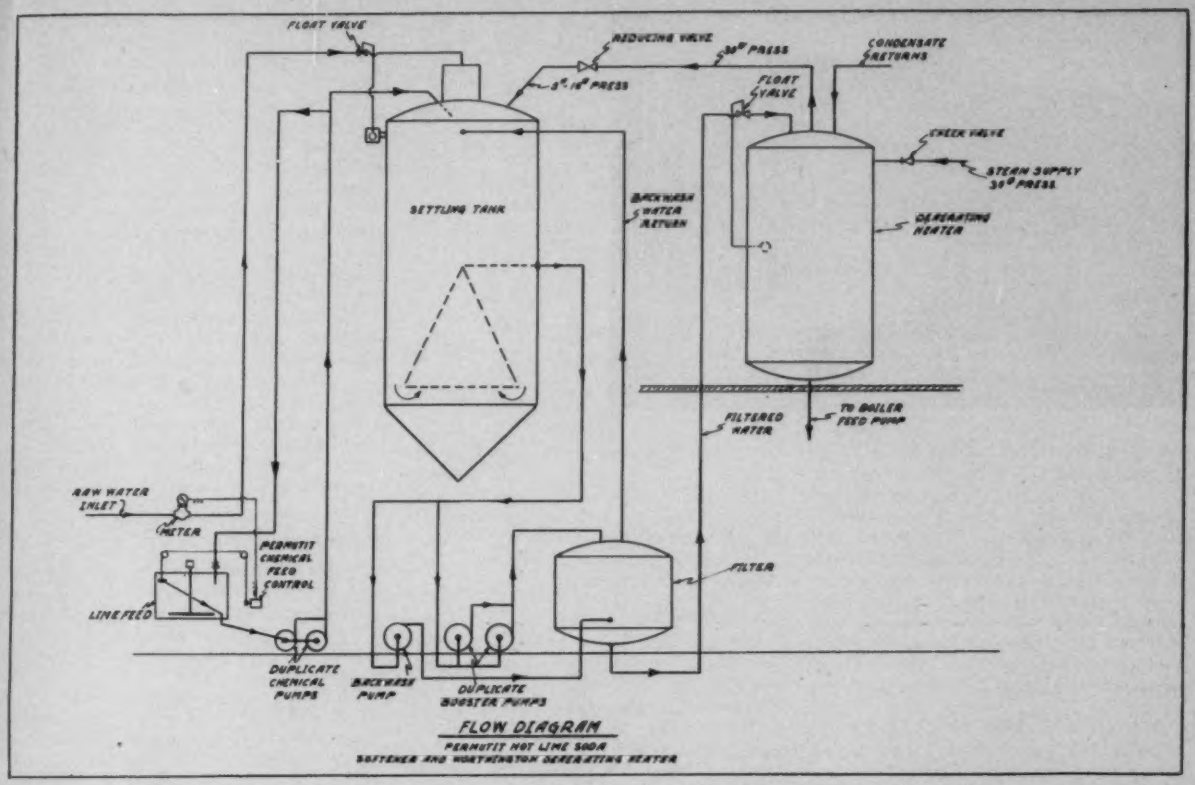
Among the features that might be cited for the Hamblet cutter are: Bakelite intermediate gears, rubber-covered squeeze rolls, ball bearing top slitters, Alemite grease fittings for high pressure lubrication, and both Hyatt and Timken roller bearings.

This cutter is served by one set of Hamblet backstands designed to handle twelve large diameter rolls of paper and by a Hamblet duplex layboy. The lay-

Left—Reel with 3-ton Jumbo roll

◆

Below—Slitter and Rewinder



FLOW DIAGRAM

PERMUTIT HOT LIME SODA SOFTENER AND WORTHINGTON DEAERATING HEATER

boy is equipped with electric motors for lowering the piles automatically and for raising the table, and with endless rubber belts for carrying the sheets to the piles.

Storage facilities for 1800 tons of bag rolls are available on the floor directly below the finishing room.

Rolls from storage or from the machine room are delivered to the bag factory on skids through the use of three Automatic platform type trucks. Trolleys and grabs unload the skids.

The Bag Room

One-half of the bag factory building is devoted to high speed bag machine installation, paste preparing room, and printing department. Many of the bag machines are equipped with presses for printing the bags directly on the machine. Other presses are installed for printing the bags after they are made. Paste from the paste preparing room is pumped to each individual bag machine throughout the factory.

The other half of the building is arranged for the baling, storing, and shipping of the finished bags. The bundled bags are piled on pallets and then delivered to storage or directly into cars with an Automatic forked type truck.

Storage facilities are available for 3000 tons or more of bags and paper; while an enclosed train shed provides shipping facilities.

Power Plant

Three Sterling boilers, each with a superheater and an air preheater, make up the boiler installation of the power plant.

Two of these boilers are equipped with Hofft grates for burning bark and wood refuse and with oil burners for auxiliary firing. The third unit is equipped only for burning oil.

Each of the boilers has a heating surface of 4785 sq. ft. and a maximum capacity with oil firing of 43,750 lb. of steam per hour. They operate at 430 lb. pressure with 735 deg. Fahr. total temperature of steam.

The feed water requirements for the boilers are met with condensate from the paper mill and from a make-up water of the following analysis:

	p p m
Total hardness calculated as $CaCO_3$	97
Calcium hardness calculated as $CaCO_3$	50
Magnesium hardness calculated as $CaCO_3$	37
Alkalinity calculated as $CaCO_3$	100
Free CO_2 calculated as CO_2	.....
Chlorides calculated as Cl	6
Sulphates calculated as SO_2	7
Iron calculated as Fe	1.2

This make-up water is softened by a Permutit hot lime-soda softener which involves a heater, chemical reaction tank, filter and automatic equipment for proportioning and feeding lime and soda ash for chemical treatment.

Final deaeration of the filter softened water is obtained by delivering it to a Worthington deaerating heater which also receives and deaerates the paper mill condensate.

The boilers are blown off continuously through Permutit continuous blow-off equipment of the flash type. This equipment includes a flash tank, a plate type heat exchanger and flow control valves for regulating the rate of blowing off the individual boilers. The live steam goes to the heater of the hot lime-soda softener and the water drained from the flash tank passes through the heat exchanger where it gives up its heat to the raw water on its way to the water softener.

Control of the chemical treatment is under the direction of Hall Laboratories.

Automatic combustion control for the three boilers is obtained with Smoot equipment. This equipment includes a master controller and one fuel oil regulator, air flow regulator and furnace draft regulator for each boiler.

The master controller makes it possible to maintain the steam header pressure constant at all times, or to operate any of the boilers at a constant rating, or at any ratio of ratings to each other. The fuel air ratio or CO_2 of each boiler may be set and adjusted at will.

The fuel oil regulators are arranged to maintain the flow rate of fuel oil to the burners in proportion to the air loading pressures or impulses received from the master controller; while the air flow regulators, also governed by impulses from the master controller, operate the dampers in the discharges of the induced draft fans. The furnace draft regulators, in turn, operate the dampers in the discharges of the forced draft fans.

Republic instruments provide operating indications for each boiler and also record essential operating data.

The power plant boilers and the recovery boilers are served jointly by an

Construction offices for second unit

M. W. Kellogg radial brick chimney, 12 ft. inside diameter at top and 250 ft. high, while the steam from both plants is combined into one header for delivery to a General Electric 7500 kv.-a., 2300 volt, 3600 r. p. m., double extraction condensing turbine generator unit.

The turbine is arranged to supply steam for process requirements at 35 lb. and 135 lb. pressure. Reducing valves and a Smoot straight line, Venturi type, desuperheater regulate and control this steam.

When the demand for 135 lb. steam exceeds that supplied by the turbine, steam is by-passed from the main steam header and reduced to a pressure of 135 lb. before reaching the desuperheater. In like manner, when more 35 lb. steam is required than is supplied by the 35 lb. bleed line from the turbine, steam is by-passed from the 135 lb. line above the desuperheater and reduced to 35 lb. by passing through a low pressure reducing valve prior to entering the 35 lb. line.

The auxiliary equipment of the power plant includes two Hardie-Tynes air compressors, each delivering 900 c. f. m., a motor-driven feed water pump, a steam driven feed water pump, a surface condenser with 4150 sq. ft. of heating surface, a 4000 g. p. m. circulating pump; and a steam driven fire pump of 1000 g. p. m. together with a motor driven fire pump of the same capacity.

The main switchboard, located on the turbine room floor, is of the modern dead front steel construction for generator panels as well as for the high and low voltage feeder panels.

A 20-ton overhead traveling crane serves the turbine room.

Machine Shop

The machine shop, which is located adjacent to the paper mill finishing room, is equipped with lathes and drill presses, milling machines, etc., and with a Lobdell No. 5 motor-driven geared head roll grinder.

The Lobdell roll grinder is capable of grinding rolls up to 42 in. in diameter and up to 246 in. face length. An automatic crowning device and a circulating oil system, which distributes oil to all moving parts and furnishes the ways and lead screw with a bath of filtered oil, are two of the features of the machine.

Adjoining the machine shop is a mill supply storehouse for the handling of repair materials, supplies, wires, and felts.

On the basement floor directly beneath mill supply storage is an electric repair shop.

Offices, Laboratory and First Aid

The office building houses not only a modern air conditioned office, with private offices paneled in walnut, but also the chemical laboratory and the first aid department.

About 2000 sq. ft. of floor space is given over to the laboratory which is well equipped with ordinary chemical apparatus and supplies as well as with equipment for the testing of papermaking fiber. A complete Valley testing outfit makes up part of this equipment.

The laboratory also includes a dark room that is equipped with a silver cloth screen.

Three test stations in the mill complete the laboratory set-up.

The first aid department, immediately adjoining the laboratory, is arranged conveniently to handle any minor injury. Every provision is made to expedite this work.

The walls of the several rooms making up the department are painted white; while the floors of the rooms are covered with an easily cleaned linoleum.

Water Supply

Water for fire protection and for the circulating pumps for the turbine and evaporator condensers is obtained from the Savannah River through an intake protected with a Link-Belt traveling screen.

Two deep wells, each equipped with an automatically controlled Layne vertical turbine pump, supply fresh clean water for boiler feed and process requirements. One of the wells, a 24-in. unit, delivers 4,000 g. p. m.; while the other, a 10-in. well, delivers 800 g. p. m.

The temperature of the deep well water approximates 78 deg. Fahr. throughout the year.

Other Equipment

There is approximately 9000 connected horsepower in the mill. Half of this power is in synchronous motors. All motors of 50 hp. capacity and above operate on the 2300 volt system.

Among the larger motors are the ten 350 hp. synchronous motors for driving the jordans, two 250 hp. synchronous motors for operating pumps, one 150 hp. boiler feed pump motor, two 175 hp. compressor motors, and one 200 hp. fan pump motor.

Left—First aid department. Right—Chemistry laboratory

Practically all of the pumping requirements of the plant are met with Goulds pumps. These pumps are used for such process applications as the handling of weak, green, black and white liquors as well as for white water and stock. In addition, they are employed on boiler feed, water softening, hot water supply and for fire pump service.

Seven Connersville vacuum pumps serve the paper machine. Five of these pumps are of the size designated as 12 by 18, while the other two are the 10 by 15 size.

Apparatus is installed for supplying air to the roof of the paper machine room and to the bottom felt of the paper machine. The balance of the mill is heated with unit heaters.

General Observations

The space and location given over to windows in the various buildings makes for excellent natural lighting over the entire working area. Adequate artificial illumination also is provided for every department within the mill. Both of these conditions are enhanced somewhat through the painting of interior walls and ceilings with suitably colored paints.

Forty-five tons of Metalicron were put into the concrete floors of the finishing room, boiler house, turbine room, shops and stores, and in the working aisles of the machine room and stock preparation plant; while a little over a ton of Embeco was used for grouting under equipment.

Good use, likewise, has been made of safety treads, gratings, railings, and guards. Such precautions together with good lighting facilities are real accident preventative measures.

Convenient wash rooms are available to all departments and numerous drinking fountains of attractive design are located strategically throughout the mill.

Several nattily uniformed police are on duty at the mill at all times. These men, under the supervision of a chief, not only protect mill property but likewise courteously receive the visitor at the main entrance to the mill.

Future Program

Work is already under way for the building of a second unit to this mill. This second unit is to be of the same capacity as the unit now in operation.

Foreseeing the possibility of this development, provision was made in the designing and building of the first unit to accommodate such an expansion. The machine room, for example, was laid out to house another paper machine of the same size as that now installed and erected accordingly.

Plans, likewise, are under way to landscape at least a portion of the property adjacent to the mill buildings, to preserve the beautiful live oaks, and to build a club house at the mill end of the drive which they flank near the spot where the Hermitage plantation mansion formerly stood.

Engineering and Construction

All engineering work in connection with the building of the first unit was under the direction of George F. Hardy, Consulting Engineer. Mr. Hardy's representative on the ground as resident engineer was A. G. Ready.

Merritt-Chapman & Scott Corporation, an engineering construction corporation, did the actual building.

These same organizations have been retained to design and build the second unit; Mr. Hardy as consulting engineer, Mr. Ready as his resident engineer, and Merritt-Chapman & Scott as the erecting organization.

The general superintendent of construction for Merritt-Chapman & Scott on the first unit was J. T. McLellan. L. D. Smiley is serving in this capacity on the second unit.

Representatives of the Union Bag and Paper Corporation who were closely associated with the building activities of the first unit and are also active in the affairs of the second unit include J. H. Allen, Director of the Union Bag and Paper Corporation of Georgia, a subsidiary of the parent company; J. T. Gamble, General Manager of Mills; W. W. Henderson, Assistant Manager, and D. G. Moon, Chief Engineer.

Associated with these men in the operation of the present plant in an executive capacity are: E. H. Mayo, Assistant Manager; John Milam, Paper Mill Superintendent; Samuel M. Dodge, Sulphate Superintendent; R. B. Cowan, Superintendent of Power; G. R. Dubus, Master Mechanic; and O. W. A. Rodowski, Chief Chemist.

GEORGE F. HARDY

Consulting Engineer

305-309 Broadway, New York City, N. Y.

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EQUIPMENT USED IN

U-Bars, Speed and Load Determines Capacity

The U-Bar-Welded Barking Drum

Higher capacity than any other type of drum. 2—12'x45' U-Bar Drums bark all the wood for a daily production of 650 tons per day.

Less upkeep than any other type of drum, no bolts to tighten nor rivets to replace. Our drum is guaranteed against repairs for two years. We have fabricated 24 Welded Drums the last two years.

F.M.P. Circ. & Indirect Heating System

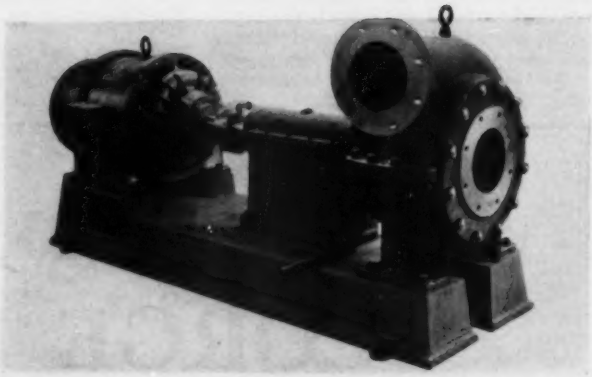
Higher concentration of liquor as no steam condensed in the digester.

Condensate from the heater returned to the boilers.

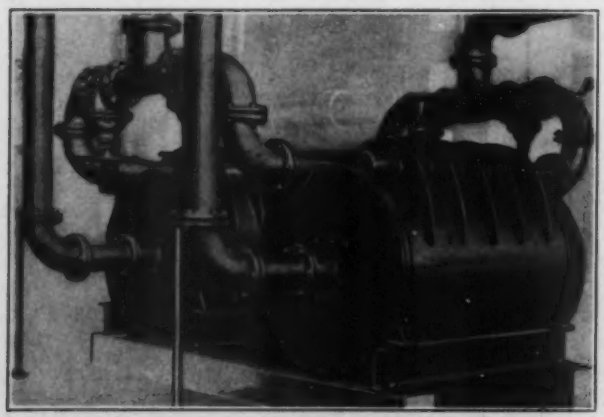
Better pulp as the temperature is uniform throughout the digester.

Better yield and saving in chemicals.

28 of these systems sold during the last 5 years.



F.M.P. Circulating Pump



Spiral Heat Exchangers for a 350 Tons Kraft Mill

Rosenblad Blow-Steam Condenser Plant

The contaminated blow-steam is heating clean fresh water for washing the pulp.

The steam is condensed in a jet condenser, the hot water from the condenser goes to an accumulator from where it is drawn off continuously to the spiral heat exchangers where fresh water is heated. Heat exchangers are small as they work continuously, there is less corrosion than with the intermittent operation of surface condensers. The Rosenblad System utilizes all the blow-steam even under peak load, no steam to the atmosphere, 25 plants in operation.

ADVERTISING PAGES REMOVED

Reducing Color to Black and White

D. K. DONOVAN, The Color Room
The International Printing Ink Corporation

NAMES of colors are rapidly becoming meaningless, as far as industry is concerned. Red signifies the color of sunsets, blood, roses, fire, and rust. Eggs, linen, milk, cotton, and teeth are all white. But obviously, there are many gradations in shade and hue which distinguish the "red" of blood from the "red" of rust; the "white" of milk from the "white" of cotton, and so on. The science of color demands more accurate classifications than the ordinary general color terms. Dye, ink, paper, paint, and other manufacturers, advertisers, artists, and designers recognize the existence of the multitude of shades and differences in colors and realize the need for more exact color specification.

Experts can distinguish minute color variations, when they have a standard of comparison. But their findings take considerable time, and while generally accurate, their judgment is not infallible. Then too, in this type of analysis, there is the difficulty of establishing a reliable standard—one that can be used as a true and unvarying basis of comparison.

A new instrument has been developed which removes the inconsistencies of human eyes from color measurement and reduces it to a mathematical, mechanical science. This instrument, called the recording photoelectric spectrophotometer, was recently installed at The Research Laboratories of The International Printing Ink Corporation where it is setting high standards in color analysis and matching. It was invented by Professor Arthur C. Hardy of the Massachusetts Institute of Technology. The machine at IPI is the first one of this type in commercial service.

The recording photoelectric spectrophotometer, known to its intimates as the "Specter," charts in three minutes an analysis of any color, telling exactly how much of each wave length of light is reflected by the sample. The human element does not enter into the workings of this machine, for its action is entirely automatic. A color blind man with no technical training can operate it as successfully as a trained optician with normal vision; intelligent interpretation of the curves produced, however, requires a highly specialized knowledge.

This instrument is being used at IPI principally for color matching and standardization, although developmental work now in progress is expected to widen its sphere of application. The machine provides a means of assuring absolute color matching. Two colors which look exactly alike under, say, incandescent light might be shown by the Specter to have different characteristics. But if the charted wave lengths obtained for two color samples in the spectrophotometer are the same, these colors will be identical under any kind of illumination—sunlight, north sky light, neon, sodium vapor, mercury arc, or any light source at all. There can be no argument as to color match, if Specter curves coincide. Human vision and judgment are fallible, but the optician's lens and photoelectric cell do not err.

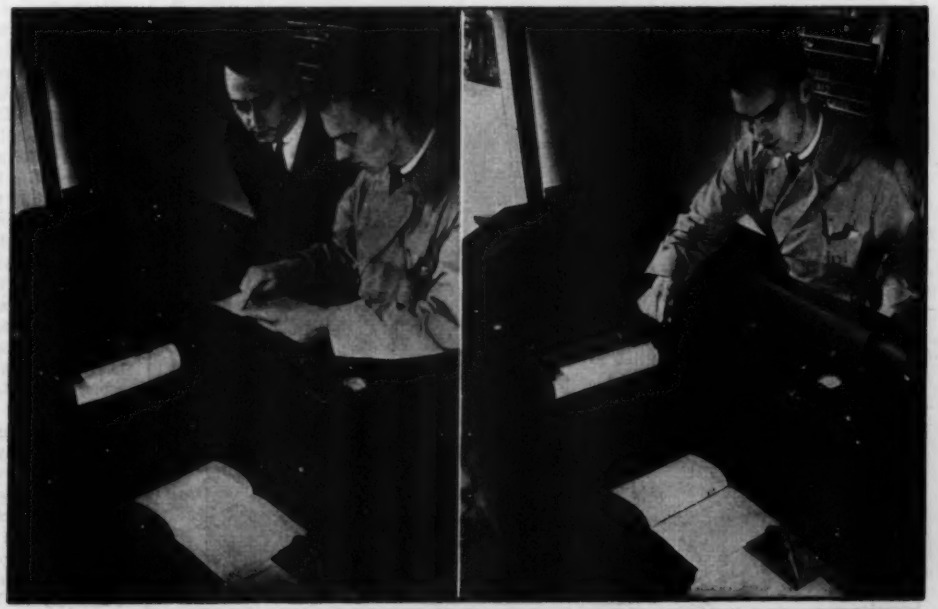
Before proceeding further, it might be well to discuss, without becoming technical, just how the Specter works. Compared with the intricate workings of the human eye, its mechanics are simple. In human vision, the millions of wave lengths of light in the spectrum are accommodated and analyzed all at once as they strike the retina of the eye. The spectrophotometer admits and analyzes only one wave length of light at a time.

This machine measures how much light is reflected by any colored material. To put it another way, it measures the difference in reflectance characteristics between the sample being tested and pure white—in other words, just what shade of color the sample is. Since there are many wave lengths in the spectrum, it is important to measure the reflectance of the sample for every one.

The Specter is shaped like a "U." At one end, the sample to be tested and a pure white standard, usually magnesium oxide, are placed in neighboring positions in the walls of a sphere. The walls are coated with magnesium oxide also to assure maximum illumination within the sphere.

At the other end of the "U" is the light source—an ordinary tungsten filament lamp. Light from this lamp passes down a metal tube and through a prism which creates a spectrum. This light is directed through a small slit which moves from one end of the spectrum (the violet) through to the other end (the red). This moving beam of light, constantly changing in color, passes through another prism which purifies it further so that it becomes essentially monochromatic.

The light beam then goes through the photometric system where it strikes the sample and the pure white standard alternately 60 times a second, due to the rotation of a polarizing element. As the light is changed, passing through the wave lengths of the spectrum from



IPI technicians inspect one of the curves turned out by the Specter. The apparatus is charting another curve on the graph roll shown near the center of the picture. Most of the mechanical details of the Specter are covered by a protective housing and are not visible. The optical devices used are enclosed in the "U" shaped metal shed which covers the top of the instrument. Samples to be analyzed are placed at the end of the tube to the right

violet to red, a photoelectric system automatically brings the photometer to balance for each successive kind of light. Through a mechanical arrangement, a revolving drum records a graph line connecting the balance points. Thus a graph, depending on the balance point for each wave length of light, will be obtained for every color sample analyzed.

The Specter charts provide a universal and extremely accurate method of color measurement. Colors may be analyzed and matched, not by visual comparison, but by comparing charts.

These charts are ideal for filing. Actual color samples kept for record usually fade somewhat as they age, but charts, of course, provide an unchanging and permanent record of any color sample.

How have these principles been put to practical use? Here are some examples. A national advertiser had difficulty in keeping the blue which identified his packages consistent with each new printing. His printers could not always match exactly the shade of his sample, and as a result, the color of his packages varied occasionally. So a spectrophotometric curve was plotted and adopted as his color standard. Now inks to print his packages must closely approach this curve. The blue of his packages will always be the same—even under different types of illumination—and the standard will be preserved indefinitely, safe from the effects of fading or deterioration.

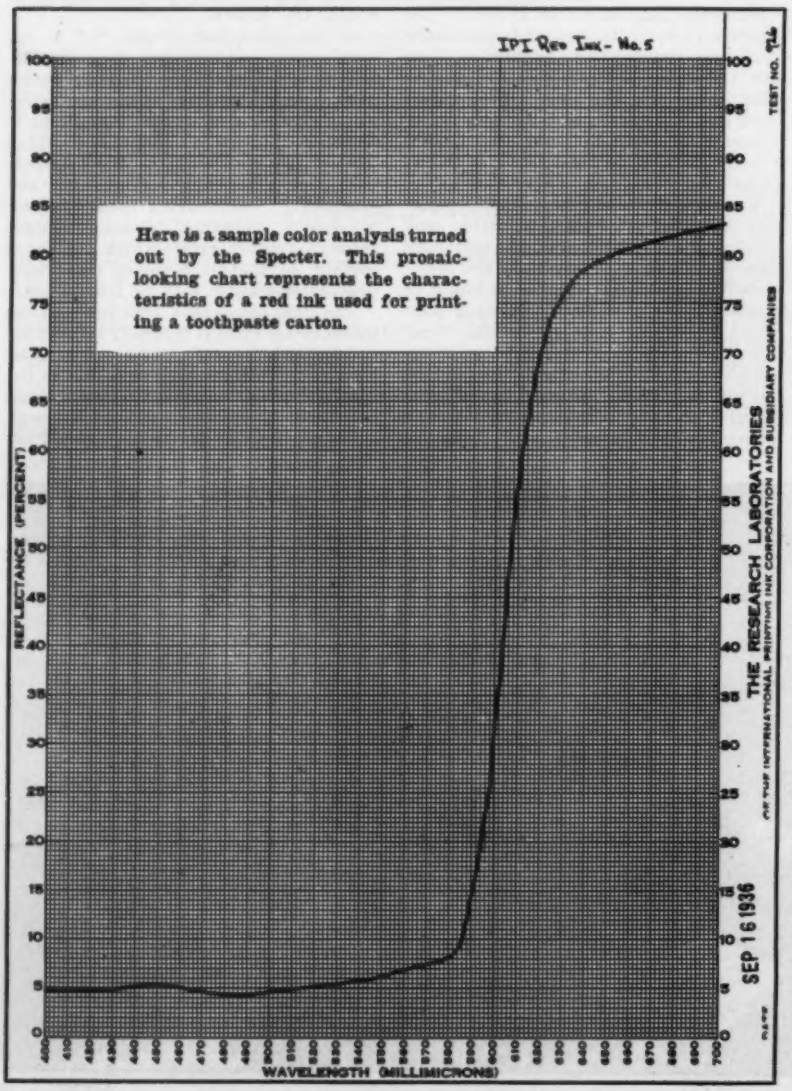
Incidentally, to make sure that they will remain unchanged and absolutely standardized, the school colors of the Massachusetts Institute of Technology have been charted by the Specter.

Cornell University's color is carnelian—a difficult shade of red to define or specify. Many arguments have developed on just what the true shade of carnelian looks like. A piece of ribbon has been kept as the standard to settle controversies, but now this unusual color can be plotted spectrophotometrically. In future years, there will be no quarrels or disagreements about the proper shade of carnelian—and presumably the followers of the "Big Red" can bask in the assurance that Cornell's color has been indisputably established for all time.

Representatives of a national advertiser recently met with chemists from an ink company to decide what shade of blue should be used on the advertiser's packages. Not a color sample was in sight. The men studied graphs from the spectrophotometer. After an examination of the various curves, one was picked as representing the shade most suitable for the package. They had decided on the color without even looking at actual samples.

With color rapidly becoming a more important factor in packaging, advertising, and merchandising, it is essential that a scientific approach to color be cultivated and developed. Despite the tremendous increase in the use of color, the science of color is just beginning to be understood. It stands today in a comparable position to astronomy when Galileo invented the telescope, or chemistry when Lavoisier first liberated oxygen from mercuric oxide.

The recording spectrophotometer provides a tool with which men can develop a scientific approach to color—an approach which will contribute immeasurably to the practical applications of color in industry.


IPI Red Ink - No. 5
REFLECTANCE (PERCENT)
WAVELENGTH (MILLIMICRONS)
THE RESEARCH LABORATORIES
OF THE INTERNATIONAL PRINTING INK CORPORATION AND SUBSIDIARY COMPANIES
SEP 16 1936
TEST NO. 746
Here is a sample color analysis turned out by the Specter. This prosaic-looking chart represents the characteristics of a red ink used for printing a toothpaste carton.

◆ ◆

◆ Commercial Paper Machine for Forestry College

Most significant in the field of training technicians and potential paper mill superintendents and managers is the decision of the New York State College of Forestry to install, in its department of paper manufacture, a commercial size paper machine. This department already has done conspicuous work in this field under the direction of Professor C. E. Libby. The institution has developed to a high degree the practical aspect of the training of young technical men for the paper mill field as evidenced by the success its graduates have achieved.

The department recently ordered from the Sandy Hill Iron & Brass Works a commercial size paper machine to be installed in its laboratory, and on this machine the training of the young men taking the pulp and paper making course can be carried to a point which never before has been reached in schools providing training for the industry.

The paper machine is designed to run at a speed which will permit the students at the college to manufacture most grades of paper under the conditions obtained in the mills where they may work later. In addition to giving a very definite idea of the many variables in the operation of a paper machine, an opportunity will be presented for individual students to study, through a range of different conditions, some particular aspect of the operation of a paper machine. For example, it may be possible for one student to study all the effects produced in the final sheet of paper by variations in the distance and

speed of the shake. In this way, data will be developed from which the practical papermaker, who has not time to try all the different possible combinations on his own machine, may draw conclusions of value.

Study of many problems of this nature will be initiated by the papermaking department. But, in addition, with a really commercial machine available, it is believed that many paper manufacturers will bring their special problems to the school to be worked out under some mutually satisfactory arrangement.

In order that this machine may satisfy all demands, Professor Libby and Assistant, Professor Hisey, have given careful thought to its design. Co-operating with these gentlemen, the engineers of the Sandy Hill Iron & Brass Works have laid out the machine to make it possible to vary the papermaking conditions in every reasonable way.

The machine will consist of screens, headbox, fourdrinier part, suction couch roll, presses, dryers, size press, calenders, reels, cutter and winder. There also will be a five-cylinder wet part so arranged that the same presses, dryers, and calenders may be used to handle the web formed on the cylinders. The fourdrinier is designed to allow study of the many ways in which the formation of paper may be affected by rearrangement and interchange of parts of the fourdrinier. This idea is carried throughout the other sections of the machine as far as is practical.

The real point is that the machine is in no sense a toy or something to be set on a laboratory table. It is a paper machine of commercial size on which it is possible to reproduce the conditions which the men studying Professor Libby's courses will meet when they go to work in the paper mills of the country.

Data developed on this machine will have a force which laboratory data perhaps have never before carried. Paper manufacturers who send their problems to the paper manufacturing department of the New York State College of Forestry can feel sure that the answers they get are produced under conditions which are the same as they would create on their own paper machines.

Professor Libby has given much thought to the installation of a machine which is primarily commercial in construction. The Sandy Hill Iron & Brass Works has conceived a machine which makes it possible to vary in many ways the conditions under which paper is made, and has introduced into it a number of the company's own special features.

The pulp and paper laboratories of the New York State College of Forestry are already equipped with the most up-to-date apparatus for studying and testing paper mill fibers and manufactured paper. An effort is being made to complete the installation by the early part of the second semester of this college year so that the class of 1937 may have some experience with the machine. However, future graduates of the paper manufacturing department of the forestry college will have their training as pulp and paper mill technicians rounded out by experience in the actual study of paper machine conditions, and by determining for themselves the results of varying these conditions on an operating commercial paper machine.

◆ New Spectrophotometer for Institute

The Institute of Paper Chemistry, affiliated with Lawrence College, Appleton, Wisconsin, has contracted for one of the new 3-unit recording spectrophotometers now being built by General Electric. The instrument interprets color scientifically by utilizing monochromatic light. Its purpose is to record, by means of a moving pen, the amount of the various colors of the spectrum reflected from an object of any given color.

Finding that color interpretations of the human eye are too inexact for many scientific and industrial purposes, scientists tackled the problem of finding some physical means of reducing human error to a minimum. The recording photoelectric spectrophotometer draws a curve giving percentage of light reflected for all wave lengths of the visible spectrum. Its recordings are correct to within one-half of one per cent and form permanent records of the colors tested. These records could be sent to a distant point and colors there could be made to match the original colors by use of the spectrophotometric curves. It would not be necessary, for example, for one in New York, in matching a certain color in Paris, to have an actual sample of the color to be matched, if a spectrophotometric chart were available for the color.

The Institute now possesses one of the six original spectrophotometers built by General Electric several years ago and designed by Professor A. C. Hardy of the Massachusetts Institute of Technology. The new machine, which is in three units, obviates mechanical difficulties present in the older model. The Institute of Paper Chemistry has been using the older machine successfully for the determination of color values in papers for the past several years.

◆ Southern Kraft to Build New Southern Plant

Decision of the Southern Kraft Corporation to construct the largest kraft paper mill in the world, representing an investment of over eight million dollars, with a designed capacity of over 625 tons per day, at Georgetown, S. C., has been announced by J. C. Cullen, the paper company's president. Warren T. White, general industrial agent of the Seaboard Air Line Railway, with headquarters in Norfolk, was instrumental in the location of the new plant.

The coming of the Southern Kraft mill to Georgetown, Mr. White states, adds further impetus to the rapidly developing recognition being given South Atlantic plain locations as desirable for paper and other manufacture. Two other large pulp and paper plants are now in process of construction on the Seaboard, one at Savannah, the other at Charleston.

Construction of the new plant, which is to begin immediately, gives employment to several hundred men for the next ten or twelve months, when the mill is expected to begin active operation. At that time 1,200 are to be employed in the mill, with an additional thousand working in the woods. To complement the rail facilities already provided by the Seaboard Air Line Railway, Southern Kraft's plans contemplate the construction of a dock frontage of more than 1,500 feet on the 500 acre site with accommodations for ocean-going vessels.

The development of this Southern Kraft plant is expected to transform the industrial life of Georgetown, the entire coastal plain section, and place South Carolina in an outstanding position in the pulp and paper world by the large increase in employment, through the several million dollar payroll, large purchases of wood and other raw materials, coupled with the experience and prestige of the Southern Kraft Corporation in the manufacture and sale of pulp and paper products.

Despite the fact that the Southern Kraft unit at Georgetown is to be the largest in the world, it is laid out, through the foresight of Mr. Cullen, regarded as one of the outstanding pulp and paper executives and who is also president of the parent company, International Paper Company, so that additional units may be constructed in the future in accordance with the demands of the growth of the industry.

In commenting on the selection of Georgetown as a location for the new mill, officials of the paper company were high in their praise of officials of the Seaboard, and of the city and county of Georgetown for successfully developing all requirements essential to the construction of the plant.

Southern Kraft, in addition to the project at Georgetown, operates large mills at Panama City, Fla., Mobile, Ala., Bastrop, La., Moss Point, Miss., and Camden, Ark., while the International Paper Company operates many mills for the manufacture of kraft and large volumes of other paper including newsprint throughout the northern part of the United States, and Canada.

◆ Paper Makers Chemical now Department of Hercules

Following the regular Board of Directors meeting recently, R. H. Dunham, president of Hercules Powder Company, announced that, as of November 2, 1936, Hercules has acquired the assets of its subsidiary, Paper Makers Chemical Corporation. Paper Makers Chemical Corporation has been operated as a separate company since October, 1931, when it became associated with Hercules.

The business, formerly conducted by Paper Makers Chemical Corporation, will be continued by the Paper Makers Chemical Department of Hercules Powder Company. W. J. Lawrence, formerly president of PMC, has been elected a vice president of Hercules Powder Company and general manager of its Paper Makers Chemical Department.

◆ Westinghouse Makes Bucher Executive Vice President

At a meeting of the Board of Directors of the Westinghouse Electric and Manufacturing Company, George H. Bucher was elected executive vice president of the company with headquarters at Pittsburgh, Pennsylvania. Mr. Bucher is also president and general manager of the Westinghouse Electric International Company.

Mr. Bucher has been connected with the Westinghouse organization since September 1, 1909. After graduating from Pratt Institute, Brooklyn, in both steam and machine design and also electrical engineering, Mr. Bucher joined the Westinghouse Electric and Manufacturing Company at East Pittsburgh as a graduate student. In 1911 he was transferred to the Export Department in New York.

In 1920, he was appointed assistant to general manager of the Westinghouse Electric International Company, and a year later, 1921, he was made Assistant General Manager, which position he held until 1932, when he was elected vice president and general manager. In 1934 he was elected president and general manager of the same company, and in 1935 he was elected vice president of the Westinghouse Electric and Manufacturing Company.

◆ FOSTER D. SNELL, INC., announces the opening of a Baltimore branch at 215 N. Calvert Street, Baltimore, Md. Both office and laboratory are located at this address. For the present this branch will be under the direction of Theodore M. Miller, who, because of residence in Baltimore, is familiar with business conditions and methods there. He has been employed for some time in the Brooklyn laboratories of Foster D. Snell, Inc. The new laboratory is equipped to carry on work of the same quality as the parent organization.

◆ Fibre Making Processes to Represent Rosenblad

Fibre Making Processes, Inc., Chicago, announces that it has been appointed exclusive representative in the United States for the Rosenblad Blow Steam Condenser Plant and Spiral Heat Exchanger for sulphate and soda mills.

The Rosenblad Spiral Heat Exchanger has many applications. Besides recovering the heat in the blow steam, it is used extensively in Europe as turpentine condensers, in series with the evaporator effects to increase the concentration of the liquor and for utilizing the heat from the vapors from the last effect.

The Rosenblad Blow Steam Condenser Plant is the most economical system for making clean hot water from the blow-steam.

Fibre Making Processes states that very soon it expects to have the services of a kraft mill engineer experienced in the Rosenblad system as well as the Sandberg diffuser room equipment, and the Gothner trap and indirect cooking systems.

◆ Oliver Official Tours Far East

J. F. Mitchell-Roberts, Export Manager for Oliver United Filters, Inc., has just returned from a six months' tour of the Far East, where he visited many plants using Oliver United filters in the Philippines, Japan, Manchukuo and China. Among the operations most frequently surveyed were mining, sugar, pulp and paper, chemical, sewage treating, cement and petroleum. Of particular interest were the Oliver and Oliver-Young Pulp Deckers and Washers.

Mr. Roberts reports favorable progress in these countries in adopting modern methods of production and in making use of American-made equipment and American ideas.

◆ BABCOCK & WILCOX TUBE CO., Beaver Falls, Pa., announces the appointment of W. W. Williams, formerly general sales manager, as general manager of the company, and T. F. Thornton, formerly sales manager of the Detroit Office District, as general sales manager.

◆ Armco Returns to the Air

Manufacturers, distributors and dealers who merchandise products made of Armco metals are making plans to capitalize on the new fall and winter series of band broadcasts to be sponsored by The American Rolling Mill Company, of Middletown, Ohio.

The famous Armco Band and the "Ironmaster" will return to the air on Sunday, November 28, at 8 p. m., over a coast to coast N.B.C. network of 26 stations. The band will be on the air every Sunday thereafter for the duration of the series.

The broadcasts are designed to promote a widespread public acceptance for all kinds of products in which Armco metals are used.

Five stations on the Pacific Coast have been added to the Armco network this year. Heretofore, the broadcasts have been confined to outlets east of the Rockies.

◆ Magnetic Becomes Stearns Magnetic Co.

The name of the Magnetic Manufacturing Company, Milwaukee, Wis., has been changed to the Stearns Magnetic Mfg. Co., according to an announcement from R. H. Stearns, president and general manager. The change does not involve any revision in corporate structure, management or plant location, simply being an effort on the part of the company to more closely identify its products with its trademark name Stearns.

R. N. Stearns, or "RN" as he is popularly known to fellow employes and a host of friends in his home town and in the trade, remains as secretary and sales manager. H. W. Harman, who has been with the Stearns engineering and research departments for many years, has been transferred to the sales engineering department and will have supervision of purchases.

The Stearns plant, which manufactures an established line of varied magnetic separators, magnetic pulleys, magnetic clutches, brakes, clutch-brake units, pipe and sheet roll conveyors, together with circular and rectangular lifting magnets, has just emerged from another one of its periodical expansions, this one an extensive addition to the main fabricating and erecting departments. The enlarged facilities will enable the popular magnetic equipment concern to catch up with its deliveries.

◆ JAMES T. SKELLY, vice president and director, Hercules Powder Company, Wilmington, Del., passed away Saturday, October 31, 1936, following an illness of six weeks. He was one of the best known men in the explosives-consuming industries, not only because of his 44 years of service, but because of his great capacity for making friends. As chairman of the finance committee and member of the executive committee, he served his company with notable distinction and aided immeasurably in the development of Hercules from its inception in 1913 as an explosives company to its present position in the chemical industry. He was 59 years of age.

◆ A FUND of $600 has been allotted to Dr. Edwin C. Jahn of the department of wood conversion of the University of Idaho school of forestry to sponsor research of a graduate student in the field of gelatinization of cellulose and wood. The fund has been made available by the committee on educational co-operation through the request of the fundamental research committee of the Technical Association of the Pulp and Paper Industry. The student has not yet been chosen.

◆ To Study Wild Land

Research to determine the best methods for practical utilization of wild land is provided for by a three-year grant to the University of Michigan School of Forestry and Conservation.

The fund, Dean Samuel T. Dana announced, comes from the trust established by Charles Lathrop Pack, president of the American Tree Association, which has founded chairs of research in forestry at several colleges.

The professorship is to be named in honor of Mr. Pack. It will be held by Lee Roy Schoenmann, a graduate of the University of Wisconsin and for eight years director of the Michigan Land Economic Survey.

The work is to be an expansion of the activities of the George Willis Pack Forestry Foundation established in 1930 by Charles Lathrop Pack in memory of his father, who was one of the pioneer lumbermen of Michigan.

Mr. Pack believes the university is in a particularly favorable position to study this wild land problem because Michigan is a state in which industry, agriculture, forestry, and outdoor recreation are all of major importance.

(From *Forestry News Digest*)

Flambeau Rebuilds No. 2 Machine

The Flambeau Paper Company has announced that orders have been placed with Beloit Iron Works for new equipment to be installed on No. 2—132" machine, which will enable it to produce a higher quality paper.

The entire press section will be replaced with the Beloit horizontal dual press, which has only recently been introduced to the paper trade. A model of this press is shown in the accompanying illustration. This press section consists of two presses; the first press is of the suction type and both press rolls are served by a common center roll. There are no top press rolls. This press is equipped with tension indicator so that the operators can maintain the proper nip pressure at each press for the best results on each grade of paper. The crowns in the press rolls are ideal for uniform water removal as it is only necessary to crown the press rolls to take care of the nip pressure and not crown the rolls to offset the deflection caused by the weight of the top rolls in the conventional manner.

This new type press section is more efficient and the sheet leaves the press suction more uniformly dry than is possible with the other type of presses. The sheet is not carried by the felt after passing through the nip; thus the sheet does not re-absorb moisture from the felt. The suction press creates a dry nip at the first press and the water squeezed out by the second press falls away from the nip by gravity, whereas with a plain press mounted in the conventional vertical manner the water is trapped back of the nip, which limits the amount of water removal of this press and also disturbs the formation of the sheet. All the press and felt rolls are mounted in the latest type anti-friction roller bearings.

The lower moisture content of the sheet and uniformity of moisture improves the drying of the paper without cockles and at a lower steam pressure; thus the quality of the paper is greatly improved.

To improve further the quality of the paper this machine is being equipped with smoothing rolls at the entrance of the dryer section, which will impart a better finish to the paper.

There will be six additional paper dryers installed to reduce further the drying temperature and also increase the production of the machine. Four special Feeney felt dryers are to be installed so that the dryer felt is dried as it absorbs the moisture from the sheet, thus preventing the paper being dried from coming in contact with a wet felt. These felt dryers are of considerable importance in maintaining ideal drying conditions for the paper.

The polished surfaces of the dryers and calender rolls coming in contact with the paper will be maintained in proper condition by new flexible type doctors.

The winder is being rebuilt and new slitters are being installed to make better rolls of finished paper.

These improvements are in line with the progressive policy of this company to adopt new equipment and new methods to constantly improve the quality of its papers.

Working model of the Beloit horizontal press installation on the Flambeau machine

◆ Thomas C. Sheldon

Thomas C. Sheldon, treasurer, secretary and general manager of the Fitchburg Duck Mills, passed away at his home in Fitchburg, Mass., October 16, at the age of 86 years.

Mr. Sheldon was one of the most widely known figures in the field of paper mill equipment. He pursued the profession of civil engineering until 1883 when he became associated with the Lancaster mills as mechanical engineer. Later he became superintendent of the spinning department and then agent. This connection was severed in 1893, when Mr. Sheldon was employed as agent by the Fitchburg Duck Mills. In 1905 when the Mills were incorporated, he was made treasurer. He served as president in 1910 and 1911 and since then as treasurer, secretary and general manager.

Mr. Sheldon was born in Fitchburg and lived most of his life in the home which his father purchased when he was but four years old. He was a leader in civic affairs and despite his advanced age he continued his business and outside activities.

Mr. Sheldon is survived by his widow.

◆ HARVEY P. CANNON has resigned as technical superintendent of the Manayunk, Pa., plant of Container Corporation of America, and has become associated with the Upson Company, Lockport, N. Y., as assistant to Roy J. Farley, vice president in charge of production.

◆ J. T. R. Bell

The Rollway Bearing Corp., Syracuse, N. Y., has suffered the loss of its president, J. T. R. Bell, who passed away October 10, 1936.

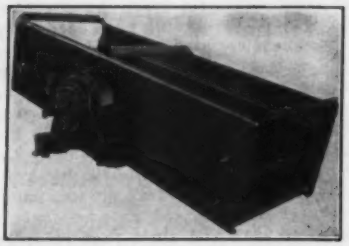
Mr. Bell was born in Scotland 57 years ago. He was well known in the bearing industry, having been associated with Norma-Hoffmann Bearings Corp. and the Gurney Ball Bearing Co. (now Marlin-Rockwell) prior to his connection with Rollway. In 1920 he reorganized the old Railway Roller Bearing Co., which became the Rollway Bearing Co. Development of the new company was due to Mr. Bell's capable management.

◆ C. J. FECHHEIMER, formerly engineering consultant in private practice, has become associated with the engineering staff of The Louis Allis Company, Milwaukee, Wis. Mr. Fechheimer recently was appointed director of the College at the Milwaukee School of Engineering.

◆ A. B. LOWENSTEIN, vice-president of Crown Zellerbach Corporation, has been transferred from New York City to the corporation's headquarters in San Francisco. H. O. Nichols, assistant sales manager of Crown Willamette Paper Company, who for the past two years has been located in New York City as Eastern Sales Manager, will succeed Mr. Lowenstein and has been appointed Manager of the Eastern Division of Crown Zellerbach Corporation with headquarters at 122 East 42nd Street, New York City.

◆ Selective Throw Vibrating Screen

A selective throw vibrating screen, known as "Selectro," has been developed by the Productive Equipment Corporation, 4600 South Kedzie Avenue, Chicago. This screen, made of stainless



steel, allows the stroke to be shifted to any one of eight positions. Other improvements in design include refinements in the method of changing tilt or angle of screen, even while screen is in operation, and in the method of lubrication, substituting oil for grease.

◆ Fire Resistant Cotton Duck

A compound to make cotton duck fire resistant has been developed by William E. Hopper & Sons Company, Baltimore, Md. Fabric treated with this compound and the compound itself are known individually as "Fire Chief." Therefore, "Fire Chief" is available either as a finished fabric under any of the Hooperwood brands of cotton duck or as a compound. The compound, shipped in cans and drums, may be applied to any type of cotton duck. Application is made either by painting or spraying. The treated duck is not only fire resistant but waterproof and mildew resistant as well.

◆ Mixer for Dyestuffs, Colors, and Chemicals

The Patterson Foundry & Machine Company, East Liverpool, Ohio, has announced a new bowl-type mixer. This mixer, made in eight sizes and with bowls ranging in diameter from 18 in. to 72 in., has rated capacities from 1 to 75

cubic feet. Large diameter balls, placed within the bowl of a mixer, revolve around its inside periphery as it revolves. The rolling action of the balls grind together intimately the materials being mixed.

The bowl and balls of a mixer may be of cast iron, steel, stainless steel, aluminum, Monel metal, copper or of other materials; and the mixer may be either belt or motor driven.

Among the applications suggested for this machine by the manufacturer are the blending and mixing of dyestuffs, colors, and chemicals.

◆ Steam Driven Compressor

Sullivan Machinery Company, Michigan City, Ind., has developed a new single stage steam driven horizontal compressor for steam pressures from 80 to 250 lb. and for air pressures up to 150 lb. in sizes from 279 to 1987 c. f. m. In this compressor, known as WA-7, the steam cylinder, located next to the frame and in tandem with the air cylinder, is heavily lagged for steam economy. The steam valve is of the balanced piston type with inlet pressure in the middle so that the valve rod box is sealed against exhaust pressure only. A variety of controls is available to best meet each operating condition.

◆ Combination Mercury and Incandescent Lamp Diffuser

The Benjamin Electric Mfg. Co., Des Plaines, Ill. has brought out a combination mercury and incandescent lamp diffuser for application where it is de-

sired to obtain light of greater color accuracy than is provided by the mercury lamp.

The unit combines a 250 watt mercury lamp and one 300 watt or two 150 watt incandescent lamps with a porcelain enameled steel dome type reflector and a diffusing globe of opal glass.

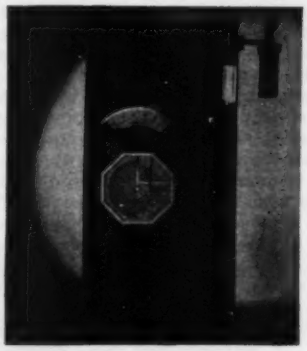
The mixing of the yellow-green light rays of mercury lamp and the predominantly red rays of the incandescent lamp in this combination fixture provides a light which is described as being psychologically cool and as simulating daylight.

◆ Paper Machine Tachometer

A wide-strip tachometer, which employs the potentiometer principle of measurement and which is suggested for recording paper machine speeds, has been added to the line of instruments of The Bristol Company, Waterbury, Conn. This instrument records speed in feet per minute on a chart 12¼ inches wide and indicates on an easy-to-read scale 1¼ inches high. It is used as part of a complete system to give information of past and present performance of a machine, the system consisting of a magneto connected to a shaft of the paper machine, an indicating tachometer at machine to guide operator, and the wide strip tachometer as the recorder.

◆ New Design of CO_2 Meter

Republic Flow Meters Company, 2240 Diversey Parkway, Chicago, has incorporated a number of developments in a new design of CO_2 meter. This meter, measuring flue gas by the Orsat Method and built to duplicate mechanically this

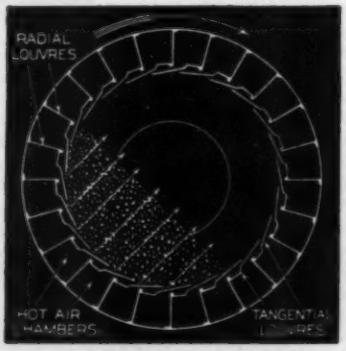


chemical analysis, is driven by a fractional horsepower electric motor. No water is required for its operation. A large caustic tank holds enough potash to last from four to six months. The gas line, subject to a suction capable of drawing 14 in. of mercury, is equipped with a filter to remove SO_2 from the flue gas before it reaches the analyzer. Meter readings are made directly in per cent CO_2. Temperature variations do not affect them. Related factors, such as steam flow, temperature, draft, pressure, etc., may be combined in one circular chart.

◆ Rotary Louvre Dryer

Announcement has been made by Link-Belt Company, Chicago, that it has acquired the North American manufacturing and sales rights for the Dunford & Elliott rotary louvre dryer.

This dryer is in the form of a mechanically rotated horizontal cylindrical drum with a series of internal channels near



the circumference. These channels are covered by tangential plates which overlap in such a way as to leave a gap for hot air, admitted with a fan, to pass from the channels into the inside of the drum and into the material contained therein. A tapering of the channels gives the

inner lining of the drum a gentle slope from the feed end to the discharge end.

Hot air can only enter the channels when they are underneath the charge. All the gases, therefore, must pass upward through the bed of material as the drum revolves.

The dryer is suggested for numerous applications. Among the specific applications within the pulp and paper industry for which it is mentioned are the drying of bark, sawdust, and wood chips.

◆ Top Press and Smoothing Press Roll

Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., has announced a new roll for top press and smoothing press service under the name of "Rub-Roc." This roll is made of specially prepared rubber compound which has eliminated the tendency to adhere to the sheet. A mottled red and black surface gives the roll a distinctive appearance.

The manufacturer claims that this new roll will not "pick-up" or crack in service. Other advantages cited include decreased felt wear and avoidance of sheet crushing.

◆ Pipe Leak Repair Clamp

The M. B. Skinner Company, 3747 West Sample Street, South Bend, Ind., has brought out a new design of pipe clamp for the repair of leaky pipes. This clamp, made in sizes ranging from ½ in. to 12 in. and in lengths from 3¼ in. to 12 in., is hinged on one side for ease in putting on. Cadmium-plated steel bolts draw the two parts of the clamp tightly

against a gasket used in connection with it to cover the leak. The gasket in each case is resistant to the material being conveyed through the line on which it is used.

Leaks in air, steam, chemical, pulp and other types of pipe lines can be stopped with this clamp. Installation can be made without a shut-down except upon extremely high pressure lines.

◆ Shredder Knives

High grade steel shredder knives for shredding sulphite and other pulp material cost $200 per set and had a life of only a month at an Ohio paper mill. A set of worn knives was salvaged from the scrap pile and hard-faced at a cost of $90. The hard-faced set lasted six months—six times as long as the new steel knives. Since the hard-faced knives could easily be rebuilt for many similar periods of service, the annual cost of knives for each machine was reduced from $2,400 to $180.

◆ THE BELGO DIVISION of the Consolidated Paper Corp., Ltd., Montreal, Quebec, reports that a lost-time accident on October second terminated a period of 227 consecutive days without a lost-time injury, representing 1,055,468 man-hours exposure to hazard. The mill is located at Shawinigan Falls, Quebec, manufactures chemical and mechanical pulp, and newsprint, and during this period had an average number of 625 employees. In 1929 there were 77 lost-time accidents at this mill, giving a frequency rate of 30.53, showing the occurrence of a lost-time accident every 4.74 days as compared with their recent run of 227 days with immunity from a lost-time accident.

◆ EARLY OCTOBER reports on Sweden's timber sales this year show a total shipment of 750,000 standards against 650,000 standards one year ago. Prices are firm, and there is a beginning scarcity of material available for delivery. Sweden's entire pulp production for 1936 will be sold out, and the sales for 1937 delivery are unusually advanced for the time of the year.

◆ Research on Optical Glass at Mellon Institute

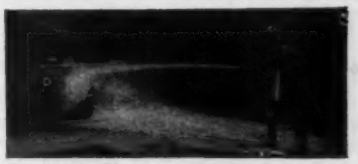
A broad program of fundamental investigations on the chemistry and physics of glass surfaces to aid in the development of scientific apparatus and ophthalmic instruments has been started at Mellon Institute of Industrial Research by the Bausch & Lomb Optical Company, of Rochester, N. Y. The first studies will be concerned with the effects of environmental factors on the durability of the various types of glass used in optical instruments.

The Bausch & Lomb Optical Company, whose research in optical glass dates from the initial work of William Bausch in 1912, has maintained a fellowship at Mellon Institute since 1931 for research on various plant and production problems in optical technology. New developments in the past have included improved greases for optical instruments, cements for ultraviolet transmitting optics, improved methods for making and testing mirrors and reflectors, and standardization of the sizes of fine abrasives used in grinding lenses.

Dr. Frank L. Jones, the fellow since 1931, will be in charge of the new investigations of the Bausch & Lomb Optical Company at Mellon Institute. An enlarged staff will continue the work on plant problems at the new research laboratory of the company in Rochester. Dr. Jones received his professional education at Bucknell (B. S., 1925) and at Columbia (A. M., 1927; Ph. D., 1931).

◆ Foam-Making Fire-Fighting Tool

Pyrene Manufacturing Company, Newark, N. J. has announced a new method of making foam for fighting flammable liquid fires. The method incorporates the use of a patented nozzle, known as Phomaire Play Pipe, and a foam making solution, known as Phomaide, in



combination with long or short water lines of ¾ in. to 2½ in. hose.

Only about 20 gallons of water per minute at 75 lb. pressure or more at the nozzle are required for this arrangement.

As the water passes through the nozzle, air and the foam making solution, the foam making solution being carried in a hip pack by operator, are automatically drawn into the water stream in proper proportions to form foam.

One gallon of the foam making solution makes 350 gallons of foam. A foam production of 300 to 400 gallons per minute can be realized indefinitely by

simply adding solution to the hip pack as required.

A water stream for extinguishing any lingering fire in ordinary combustibles may be discharged by removing the pick up tube from the solution. When this tube is again dropped into the solution, a foam stream is produced.

◆ Institute Expands and Increases Staff

New quarters recently opened at the Institute of Paper Chemistry, affiliated with Lawrence College, Appleton, have been entirely absorbed by Institute activities, it is announced. Additions to the staff account for most of the occupation of the new $100,000 building attached to the original Institute. Staff members now total 74, and there are 42 members of the student body working for advanced degrees.

Recent changes in the staff of the In-

stitute of Paper Chemistry include the appointment of Dr. Ervin F. Kurth as Research Associate, and the addition of Dr. Herbert L. Davis as a full-time member of the staff.

Dr. Kurth comes to the Institute from the Gulf States Paper Corporation at Tuscaloosa, Alabama. Previous to his association with the Gulf States Corporation, he was connected with the J. I. Case Company and the Forest Products Laboratory.

In addition, Mr. George Sears recently assumed his duties as Research Assistant. He received his academic training from the University of Wisconsin, where he was also formerly a member of the faculty. He has also been connected with the DuPont Experimental Station at Wilmington, Delaware.

◆ Herbert Crabtree

Herbert Crabtree, vice president and general manager of Adams Paper Company, Inc., Wells River, Vermont, passed away on November 3 at Hanover, New Hampshire. He was 59 years of age.

Mr. Crabtree was born in Lancashire, England and had resided in Wells River, Vermont for 35 years. His family has long been associated with the paper field. His late father, Edwin Crabtree, was president of the Adams Paper Company up to the time of his passing three years ago. This office is now held by the eldest son, David Crabtree. Of the four other brothers surviving, two are connected with paper mills: Harold Crabtree is president of the Howard Smith Paper Mills, Canada Paper Company and Alliance Paper Mills; Kay Crabtree is mill manager of the Crabtree Division of Howard Smith Paper Mills.

Surviving, besides the five brothers, are the widow, a son and one sister.

◆ KIECKHEFER CONTAINER CO., Milwaukee, Wis., has verified the report that it plans to build a new pulp mill on the southeastern seaboard. However, no definite location has been decided upon, but an announcement on this may be made soon. Present expectations are that the mill will be completed by July of next year. The mill will produce sulphate pulp only—no paper or board—and will have a yearly capacity of 60,000 tons.

◆ Norman Bardeen

Norman Bardeen, president of the Lee Paper Co., Vicksburg, Mich., passed away October 9, from fatal injuries he received when his automobile was demolished while he was on his way home from the Lee company offices.

Mr. Bardeen was born in Syracuse, N. Y., and was 59 years of age. As a young man he became associated with his uncle, the late George E. Bardeen, who operated a paper mill at Otsego, Mich. In 1904 when the Lee Paper Company was organized, he became secretary of the company. He had been president for several years.

Surviving are the widow, one daughter and two sons. One son, Maxwell Bardeen, is an official of the Lee Paper Company. The other, Norman Bardeen, Jr., is connected with the Edgewater Paper Company, Chicago. The daughter resides at home.

◆ ANNOUNCEMENT is made of the resignation of Chas. A. Kropp as president of the Kropp Forge Company, Chicago. Roy A. Kropp has been appointed to succeed him. Chas. A. Kropp becomes chairman of the Board of Directors.

◆ Chris. H. Phipps

Chris. H. Phipps, general paper sales manager of St. Regis Paper Company, New York City, passed away at the Columbus Memorial Hospital, Chicago, October 17, 1936. Mr. Phipps' death was the result of an accident in which he was scalded while in Chicago on business. He was 55 years of age.

Mr. Phipps was well known in the paper industry and had a very wide circle of friends. Before joining the St. Regis company in 1934, he was for a number of years sales manager of Watab Paper Mills, Sartell, Minn. Previous to that, he was associated with the Bradner Smith Company, Chicago.

Surviving the deceased are his widow and two daughters.

◆ SIGNODE STEEL STRAPPING CO., Chicago, announces the election of J. S. Gorman as vice president in charge of sales. Mr. Gorman has been directing the sales of the company for the past five years.

◆ Annual Meeting National Paperboard Ass'n

The annual meeting of members of the National Paperboard Association, Inc., will be held in the LePerroquet Suite of the Waldorf-Astoria Hotel, New York, N. Y., at 10:00 a. m., November 19, 1936.

This meeting is called for the election of officers for the ensuing year and for taking such other action as is specified in the By-Laws of the association. An interesting program is being arranged, which will include a report by President Sidney Frohman covering "Association Activities of the Past Year." Reports will also be made by Vice President W. J. Alford, Jr., and by group chairmen.

◆ Dr. Hauser Resumes M. I. T. Courses

Dr. E. A. Hauser, of Massachusetts Institute of Technology, Cambridge, Mass., will again give a night course during the winter. The course will be given under the supervision of the State and will include plenty of practical, interesting experiments, together with full discussions on such topics as microscopic analysis, X-ray analysis, spectroscopy, dispersing agents, etc. The price of the course will be fifteen dollars.

Dr. Hauser is not only a noted authority on colloidal chemistry, but is known for his ability to make his classes interesting and entertaining.

◆ New Catalogues and Publications

Allen-Sherman-Hoff Co., Lewis Tower, Philadelphia—An attractive new catalogue of 23 pages and cover is devoted to this company's Hydroseal Pumps which have maximix soft rubber parts. The advantages and characteristics of the Hydroseal principle, which is incorporated in the design of these pumps, are outlined and the applications of this type of pump pointed out. The text is accompanied by a number of fine illustrations with color. There are dimensional tables, charts and a two-page spread of Clearwater Performance data.

American Foundry Equipment Co., Mishawaka, Ind.—American Dustube Dust Control is the title of a new 24-page Data Book, No. 22, just issued by this company. Half of the book is devoted to description, illustration and drawings of this dust collector and to description of its application to dust control problems. The center spread is devoted to detailed drawings showing the many features and their application to individual problems. The last half of the book is given over to engineering data of interest to the technical man as well as the practical shop man in the solution of dust control problems and the maintenance of dust control equipment. There are charts, drawings and much interesting information. Copies on request.

American Manganese Steel Co., Chicago Heights, Ill.—A new folder is devoted to an illustration of typical Amsco alloy applications. Amsco alloy is recommended for making paper mill castings.

Barrett-Cravens Co., 325 West 30th St., Chicago—This company has just published a large and comprehensive catalogue on Materials Handling Equipment. The book contains 124 pages and over 385 illustrations, 200 of which are an education in themselves, in that they show the use of the company's equipment under varying conditions. In addressing inquiries to the company, refer to Catalogue No. 500.

Bausch & Lomb Optical Co., Rochester, N. Y.—Mills that have dust problems will be interested in a new folder just issued announcing the B & L Dust Counter which has been designed to provide an easy, accurate, quick and dependable means for measuring the dust concentration in your plant. Ask for No. D-183.

Black-Clawson Company, Hamilton, O.—A new piece of literature is a folder illustrating Black-Clawson Spiral and Hypoid Drives, which tells a story of design and application.

Bristol Co., Waterbury, Conn.—Bulletin No. 473 is descriptive of the new Bristol Wide-Strip Recording Tachometer. There is information also on magnetos and the various types of magneto drives that are available.

Brown Instrument Co., Philadelphia, Pa.—Catalogue No. 8901, just issued, covers the complete line of Brown Air-Operated Controllers. It explains in simple, non-technical language the principle of operation of these instruments and contains as well many helpful diagrams, illustrating their simplified construction, the ease with which they may be interchanged and the ease of tuning in for "Throttling Range and Automatic Reset." The catalogue is printed in black on coated stock with silver trim and the cover is black on silver. There are a large number of fine illustrations showing reproductions of exceptionally good, highly retouched photographs.

Consolidated Air Conditioning Corp., 114 E. 32nd St., New York City—With the modern trend toward air conditioning, executives will be interested in this company's new booklet, "Consolidated Odor Adsorbers in Air Conditioning." This booklet covers completely the cost of operating an air conditioning system. A set of tables showing the savings effected by reducing the amount of "make-up" air is included. Copies on request.

Cornell Iron Works, Inc., Long Island City, N. Y.—This company has just published a new eight-page catalogue of rolling doors and shutters, hand and motor operated. It gives a description of types and illustrates steel and bronze doors in place. Full tables of dimensions and clearances are given for automatic closing rolling doors labeled by Underwriters Laboratories, Inc., for fire walls, etc., as well as standard rolling doors. Copies on request.

Ingersoll-Rand Company, Phillipsburg, N. J.—Bulletin No. 7066 has just been issued by the Cameron Pump Division of this company. It covers their line of coupled pumps of capacities from 150 to 5000 g.p.m. against heads between 20 and 250 feet. There are many views of pump installations, as well as the construction details of the coupled pump. Copies gratis.

Johns-Manville Corp., 22 E. 40th St., New York City—The problem of how to reduce maintenance expense on industrial roofs is discussed simply and with numerous easily understood illustrations in a new 28-page booklet entitled "Things You Should Know about Your Roof." Such subjects as the following are treated: how roof troubles start; how to prevent them; how roofing felts should be laid; how finishing should be applied; how the joints in the coping should be protected; and how roofing should be placed around drains, skylights, etc. This booklet and engineering data furnished on request.

Krebs Pigment & Color Corp., Newark, N. J.—A convenient book of reference for pigment users entitled "Handbook of White Pigments," is ready for distribution. It describes the company's white pigments briefly, indicating its field of use, consistency, physical and chemical characteristics, and other pertinent information. There are tables of bulking values of white pigments, a tabular summary of consistency range, special properties and principal uses of white pigments and conversion tables giving comparison of metric and customary units.

Lewis-Shepard Company, Watertown, Mass.—A new folder, No. 225, illustrates the latest in industrial floor truck designs. It is a rather complete showing of floor trucks for factory, warehouse and industrial use. In it may be found floor trucks for the interior transportation of practically any material, merchandise or product manufactured or handled. Copies on request.

Lincoln Electric Co., Cleveland, Ohio—A booklet entitled "The New Arc Welding Technique" is devoted to the new Lincoln Shield-Arc S.A.E. Welder. The technicalities of welding are covered fully, and the entire booklet is very well written. It is profusely illustrated and printed in two colors.

Link-Belt Company, 307 N. Michigan Ave., Chicago—Link-Belt automatic coal stokers for industrial and commercial use are featured in a new 28 page book No. 1619. Among the major subjects are: scientific combustion cycle; burning heads tailored to fit the coal available; variable intermittent drive that insures an agitated fuel bed; automatic air control; stoker hopper design, etc. The book is printed in two colors and spiral bound. Copies on request.

Geo. P. Reintjes Co., Kansas City, Mo.—This company has issued a booklet setting forth the advantages of its furnace construction, which is said to be something entirely new in furnace masonry. Sectional diagrams and illustrations graphically depict the principle employed in this construction.

Republic Steel Corp., Cleveland, Ohio—This company has just published a new series of attractive booklets on Enduro Stainless Steel. In a section devoted to industrial uses, Paper and Pulp Mills head one section, with such uses as: acid circulation systems, blow pit bottoms, cooking acid exchangers, digesters, press plates, screens, splash plates, tanks, tubing, and valves and fittings. These booklets are beautifully illustrated and attractive in make-up.

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.—"Micarta in Paper Mills" is the title of a new leaflet illustrating many applications of Micarta in mills where it has effected a saving. Such applications are mentioned as: roll covers, shake springs, doctor blades, suction box covers, felt wipers, etc. There is also a booklet entitled "Where Can You Use Micarta." This includes a description of Micarta, its mechanical and electrical properties and the standard forms available.

BOOKS

Chemists' Year Book (1936)—Edited by E. Hope, this edition, the 18th, contains more than 1200 pages of reference data for chemists. The data includes material on atomic weights, physico-chemical constants, solubilities, inorganic and organic compounds, qualitative and volumetric analysis, hydrogen ion determination, fuels and illuminants, lubricants, cellulose and paper, textile fibers, dyestuffs, and various other subjects. The page size for the book, which is bound attractively in fabrikoid, is 3¾ in. by 6 in. It is a British work that is priced at $6 per copy by Chemical Publishing Company of N. Y., Inc., 148 Lafayette Street, New York, N. Y., exclusive agents for it in North and South America.

Comparative Statistics of Imports into the United States for Consumption (Volume VI, Group 4, Wood and Paper)—The United States Tariff Commission has issued this volume as a W. P. A. statistical project. It includes information on imports by countries and for the calendar years—1931-1935 inclusive. There is one section which covers statistics on paper base stocks and another section treats of imports covering paper and manufactures. The numerous tables of both sections are arranged for ready interpretation and include much data that is of value to every pulp and paper mill executive.

Der Elektro-Kraftbetrieb in der Zellstoff und Papierindustrie (Electrical power operations in the pulp and paper industry)—This little book makes no claim of basic considerations or mathematical treatment of the subject. The material is purely descriptive, and it is written for students, electrical, mechanical and stationary engineers whose interests are largely practical and centered in specific, modernized electrical equipment used in pulp and paper mills. The subject matter is divided into three main parts. (1) deals with the supply of electrical energy. (2) describes its transmission and distribution. (3) takes up in detail its utilization. Of the three, the last takes up the greater part of the booklet. The text, which is well written and excellently printed, furnishes 108 illustrations of modern electrical machinery, and gives 40 recent references to the literature. Its author is Dipl.-Ing. Walter Kuhl, its publishers are Günttner-Staib Verlag, Biberach an der Riss, and its price is 5 R. M.

Erhahrungen im Leimen von Papier, Karton und Pappe (Experiments in sizing paper, carton and board). This booklet gives a historical resumé as well as brief references to the author's work during 53 years of professional activity. Often specific formulas are given. The materials referred to are albumin, asphalt, ozocerite, beeswax, dextrin, gum arabic, rosin, carnauba wax, casein, rubber latex, sizing materials obtained from waste liquors, montan wax, palm oil and wax, paraffin, beef fat, shellac, starch, stearin, animal glue, tragacanth and water glass. There are five illustrations (drawn by the author) of equipment used in sizing. The pamphlet of 44 pages was written by Dr. H. Postl, of Modling, near Vienna, and is evidently also published by the author.

Handbook of Steam Flow Measurement—A revised edition of this handbook by L. K. Spink has been published recently by the Foxboro Company, Foxboro, Mass. This book, bound in a serviceable paper cover, contains about fifty charts and tables along with other data. In addition to the more familiar steam flow measurements applicable where pressure and temperature conditions are practically constant, detailed consideration is given to measurement under widely fluctuating pressure. Copies of this edition of the book are available without cost to power plant operators and others concerned with problems of steam flow.

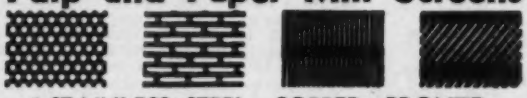
Paper Pulp from Cereal Straws by a Modified Sulfate Process—This is a miscellaneous publication designated as H124 published by the National Bureau of Standards. Baker Wingfield, E. R. Whittemore, C. B. Overman, O. R. Sweeney and S. F. Acree are the authors. Sections are devoted to a discussion of the equipment used, the experimental procedure, a comparison of the process with wood processes, summary and literature reference. Copies may be obtained from the Superintendent of Documents, Washington, D. C., for 5 cents per copy.

Procedure Handbook of Arc Welding Design and Practice—This handbook, published by the Lincoln Electric Co., Cleveland, Ohio, is now in its fourth edition. The new book contains 223 added pages of new arc welding data and 289 new illustrations including photos and drawings. The volume now contains a total of 819 pages and 990 numbered text illustrations. New data is presented on the following subjects: characteristics of the welding generator, selection of type of joint, insurance of fusion welded current, horizontal welds, sheet metal welding, effect of electrode size on welding cost, methods of testing weld metals, 4-6 chrome steel, Monel metal, principles of surfacing by welding, welded design begins with standard shapes and plates, and plate girders. The other departments have all been revised and brought up to date. The price is $1.50 per copy postpaid in the United States; outside the U. S., $2.00 per copy.

Second Report of the Pulp Evaluation Committee—This report to the Technical Section of the Paper Makers' Association of Great Britain contains details of improvements in procedure and in equipment for evaluating pulp that have come about since 1929, when apparatus and methods described in the interim report of the Pulp Evaluation Committee were officially adopted by the Paper Makers' Association. Information likewise is included in the report on the construction and operation of recommended auxiliary apparatus. The report contains individual chapters on Survey of Modern Methods of Evaluating Wood Pulp for Strength, Description of Sheet Making Equipment, Preparation of Test Sheets, Examination of Test Sheets, Determination of Drainage Time, Determination of Freeness, Rapid Drying of Test Sheets, Determination of Consistency, Determination of Slime Content of Groundwood Pulp, and Tentative Method for Evaluation of Beating Effect. The entire work is attractively printed and is bound in a green cloth cover with title imprinted upon it in gold. It was published by The Paper Makers' Association of Great Britain and Ireland, Shell-Mex House, Strand, London, W. C. 2. The price per copy is 125.6d, post free.

Timber Growing and Logging Practice in Ponderosa Pine in the Northwest—This publication, designed as Technical Bulletin 511, has been issued by the United States Department of Agriculture, Washington, D. C. It is the work of R. H. Weidman, Senior Silviculturist, Northern Rocky Mountain Forest and Range Experiment Station, Forest Service. In addition to discussing the general situation in the region, Mr. Weidman reveals the measures necessary to keep forest lands productive and to produce full timber crops. The bulletin is priced at ten cents per copy and is obtainable through the Superintendent of Documents, Washington, D. C.

Pulp and Paper Mill Screens



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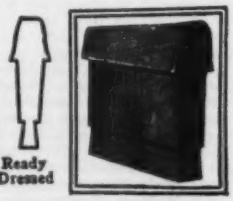

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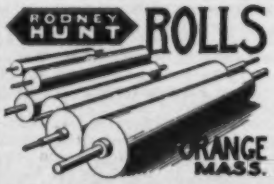

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For The Papermaker's Library

Pulp Bleaching—a symposium.

Papermaking Research Around the World, by Dr. Louis E. Wise.

Identification and Microscopy of Woods and Wood Fibers Used in the Manufacture of Pulp, by Ellwood S. Harrar and J. Elton Lodewick.

Lessons in Paper Making, Part 1, by Harry Williamson.

Lessons in Paper Making, Part 2, by Harry Williamson.

Practical Helps for the Mill Man.

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THE PAPER INDUSTRY

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◆ Some News of the British Paper Industry

For many months past, the British mills have been faced with increasing costs of raw materials, particularly wood pulp, which is mostly obtained from the Scandinavian countries. Added to this, the price of coal has advanced, due mainly to the recent concessions to the miners; also incidental materials have advanced, starch, for example by $15 per ton (2240 lb). Also machinery and replacements have moved in the same direction. After several meetings, the mills making the sulphite supercalendered printing papers agreed, recently, to advance their prices by approximately $6 per ton. The same grade of writing papers has also advanced slightly in price and wood imitation arts and hard sized printings are similarly affected. Meanwhile, there is no sign of an advance in the price of newsprint, the price for 1937 being steady at £10 per ton (2240 lb). The British makers are looking toward the American reaction to Canadian movements in this direction. It is felt that there is justification for Lord Rothermer's suggestion of a rise of $9.00 but it is believed that this will be nearer $2.50 to $5.00.

Unemployment in the paper trade continues fairly low, and improvements to established mills and the erection of new mills continues steadily. Since the establishment of a greaseproof mill in England and its successful fight against its continental neighbors other mills have been erected. The latest is at Cardiff where any additional industry is welcome, for unemployment, particularly among the miners and seamen, is very bad. Here the prime mover is William Harrison who will be remembered for his close association with the Inveresk group of paper mills, one of the largest in the country, some fifteen years ago. Adjacent to this mill also is being laid down a large coating plant which eventually will house twelve machines.

Coated papers are experiencing a boom and the mills responsible for these grades have been heavily booked for some months past. It is expected that they will continue to be so in view of the considerable amount of work which will be executed in connection with the coronation of his Majesty King Edward VIII in May of next year.

The Printing Industries Research Association which was recently altered to PATRA. (Printing and Allied Trades Research Association) in order to embrace all branches of the Graphic Arts; printing, ink, and paper has moved to much larger premises and promises, by co-ordinated effort to offer considerable help to papermaking and its allied trades.

Messrs. Wiggins, Teape and Co., which Lord Portal is chairman, continue to make fine progress as proved by the half yearly report. The company is the largest concern making rag and similar grades of papers, and their continued prosperity, apart from reflecting credit on themselves, is proof of the healthy condition of the British paper trade.

An application has been made by the manufacturers of Viscose transparent wrapping for an increase of duty of 20 to 50 per cent. The very low prices quoted by the Japanese importers is given as the reason for this application.

◆ Peruvian Paper Factory Begins Operations

A new paper mill began operations September 26, 1936. This plant, located on the Rimac River at Chosica, is preparing to produce semi-kraft paper from old jute and later will make white paper. Wrapping paper, writing paper, cardboard, cover paper, bags, and paper boxes are among the items to be produced eventually. Until March 1937 the mill will experiment with banana fiber obtained locally.

The average capacity of the plant is estimated at 8 metric tons (metric ton = 2,204.6 pounds) per 24 hour day and the maximum capacity at 14 tons.

While the present installation includes a bleaching plant, it lacks chemical recovery equipment. All machine units are second hand and of German origin, including the hydroelectric power plant. German technicians are said to have arrived from Germany recently to superintend production. Cost of the plant has been variously estimated between S/300,000 and S/800,000. At present the factory is reported to be working 12 hours daily with the expectation of working 24 hours daily in the near future.

Everything required for manufacturing the above mentioned products will be imported. Lima distributors, including representatives of American exporters, have been asked to quote

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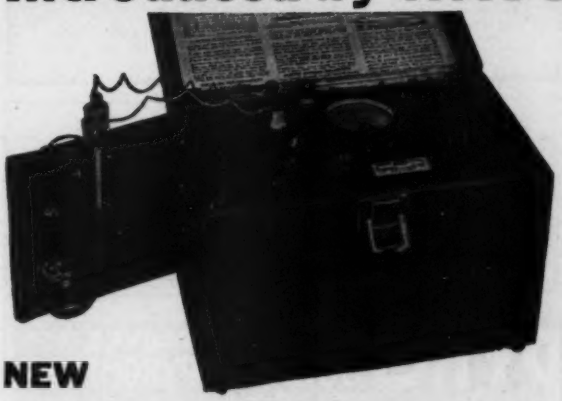

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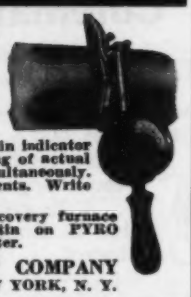

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on: Bleached and unbleached mechanical pulp, sulphite and kraft pulp, sulphate of alumina 17-18 per cent, felt, lime, caustic soda, and chlorine.

The factory's requirements will necessarily be imported through Callao and be delivered to Chosica by rail or truck.

Total Peruvian imports of paper during the calendar year 1935 amounted to 13,079 metric tons valued at a little over 5,000,000 soles. After newsprint, which accounted for almost 60 per cent of total imports, come wrapping paper, book, and low price bond paper. The United States in 1935 supplied 3 per cent of total imports.

While there are several small paper manufacturers in Peru the new factory will be the most important to date. (Assistant Commercial Attache A. Cyril Crilley, Lima)

◆ Westinghouse Elects D. S. Youngholm Vice President

David S. Youngholm was elected vice president of the Westinghouse Electric & Manufacturing Company at the last meeting of the Board of Directors. He will make his headquarters in New York.

Mr. Youngholm joined the Westinghouse organization 27 years ago. His first position was in the engineering department of the Westinghouse Lamp Company after which he entered the sales department.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of "The Paper Industry," published monthly at Chicago, Illinois, for October 1, 1936:

State of Illinois, County of Cook, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Edward B. Fritz, who, having been duly sworn according to law, deposes and says that he is the owner and publisher of "The Paper Industry" and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Edward B. Fritz, 333 N. Michigan Ave., Chicago, Ill.; Editor, Harry E. Weston, 333 N. Michigan Ave., Chicago, Ill.; Associate Editor, B. Merrithew, 333 N. Michigan Ave., Chicago, Ill.; Business Manager, Edward B. Fritz, 333 N. Michigan Ave., Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Edward B. Fritz, 333 N. Michigan Ave., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

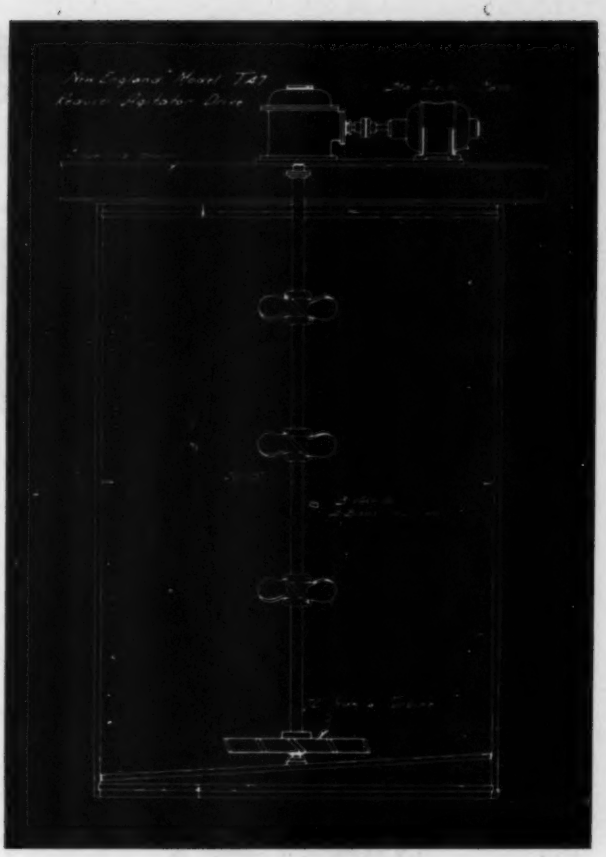
5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is ..... (This information is required from daily publications only.)

EDWARD B. FRITZ,

Sworn to and subscribed before me this 21st day of September, 1936.

[SEAL] JANE A. DeWITT.

(My commission expires August 1, 1940.)



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The Paper Industry Safety Contest

July 1, 1936 to June 30, 1937

Cum. Scores as of September 30

36 Mills Have Perfect Record

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A	Consolidated Paper Corp., Ltd.	Belgo	Shawinigan Falls, Quebec
GROUP B	St. Croix Paper Co.	Woodland	Maine
	Continental Paper & Bag Corp.	York Haven	Pennsylvania
GROUP C	Container Corp. of America	Coated Board Div.	Chicago, Ill.
	Strathmore Paper Co.	West Springfield	Massachusetts
	Crystal Tissue Co.	Middletown	Ohio
	Finch, Pruyn & Co., Inc.	Glens Falls	New York
	Strathmore Paper Co.	Woronoco	Massachusetts
	Kimberly-Clark Corp.	Lakeview	Neenah, Wis.
	Bedford Pulp & Paper Co., Inc.	Big Island	Virginia
	Container Corp. of America	Circleville	Ohio
GROUP D	Southern Extract Co.	Knoxville	Tennessee
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	International Paper Co.	Webster	Orono, Maine
	American Asphalt Roof Corp.	E. St. Louis	Illinois
	Flintkote Co.	Little Ferry	New Jersey
	Consolidated Water Power & Paper Co.	Stevens Point	Wisconsin Rapids, Wis.
	U. S. Gypsum Co.	No. Kansas City	Missouri
	Mead Paperboard Corp.	Nashville	Tennessee
	Rogers Fibre Co., Inc.	Bar Mills	Maine
	Hollingsworth & Whitney	Aroostook & Cobbossee	Gardiner, Maine
	Flintkote Co.	Lockport	New York
	International Paper Co.	Livermore Falls	Maine
	Central Fibre Products Co.	Vincennes	Indiana
	Central Fibre Products Co.	Mt. Carmel	Illinois
	International Paper Co.	Riley	Maine
	Wrenn Paper Co.	Middletown	Ohio
	Hollingsworth & Whitney Co.	Abenaquis	Madison, Maine
		Division II	
	Union Bag & Paper Corp.	Specialty	Hudson Falls, N. Y.
	Container Corp. of America	35th Street	Chicago, Ill.
	Union Bag & Paper Corp.	Grocers	Hudson Falls, N. Y.
	Container Corp. of America	Anderson	Indiana
	Container Corp. of America	Natick	Massachusetts
	Kimberly-Clark Corp.	Atlas	Appleton, Wis.
	Texas Corrugated Box. Co., Inc.	Dallas	Texas
	Bemis Bros. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P-108	2	1	1.856
	P- 44	3	1	2.142
	P- 21	4	1	2.961
	P- 62	5	2	3.909
	P- 27	6	4	4.989
	P- 28	7	6	5.265
	P-121	8	3	6.501
	P- 13	9	3	6.841
	P- 64	10	2	6.894
	P-101	11	3	7.550
	P- 12	12	3	7.623
	P- 2	13	3	7.736
	P- 18	14	6	9.881
	P- 67	15	7	9.930
	P- 9	16	8	10.744
	P- 84	17	6	11.663
	P- 19	18	5	12.530
	P- 30	19	6	13.097
	P- 88	20	4	13.236
	P-105	21	4	13.235
	P- 1	22	10	13.699
	P- 69	23	6	14.433
	P- 23	24	5	15.362
	P- 95	25	7	19.777
	P-102	26	11	20.876
	P- 73	27	14	23.202
	P- 83	28	16	23.341
	P- 87	29	13	27.754
	P- 74	30	19	40.498
	P- 40	31	15	45.309
	P- 71	32	20	59.008
	P- 32	33	22	60.271
GROUP B	P- 25	3	1	3.391
	P- 11	4	1	3.760
	P- 68	5	1	3.939
	P- 60	6	1	3.968
	P- 72	7	1	4.975
	P- 51	8	1	5.241
	P- 26	9	2	7.604
	P- 3	10	2	8.549
	P-112	11	2	9.314
	P- 4	12	2	9.777
	P- 22	13	3	10.486
	P-100	14	1	13.392
	P- 70	15	4	14.573
	P-107	16	5	16.750
	P-123	17	5	20.149
	P- 50	18	4	21.323
	P- 76	19	6	25.055
	P- 54	20	6	25.381
	P-120	21	7	28.961
	P-124	22	6	40.377
	P- 82	23	14	48.514
	P- 16	24	13	53.923
	P- 46	25	16	61.453
	P- 45	26	17	64.066
	P-122	27	18	64.320
	P- 77	28	19	67.985

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP C	P- 75	9	1	5.739
	P- 55	10	1	5.918
	P- 94	11	1	10.565
	P- 29	12	2	11.997
	P- 61	13	2	13.757
	P- 37	14	3	18.840
	P- 17	15	3	26.362
	P- 34	16	3	26.700
	P- 43	17	3	26.789
	P-103	18	3	27.807
	P- 91	19	3	32.714
	P-104	20	6	34.011
	P- 47	21	5	37.110
	P- 41	22	6	41.489
	P- 39	23	7	54.434
	P- 80	24	8	56.063
	P-111	25	8	64.280
	P- 33	26	9	64.568
	P-113	27	13	86.969
GROUP D	P- 92	18	1	13.548
	P-117	19	1	14.265
	P- 81	20	1	14.756
	P- 36	21	1	15.510
	P- 90	22	1	17.700
	P-116	23	2	22.455
	P- 99	24	1	23.061
	P- 86	25	1	24.861
	P- 5	26	3	33.561
	P- 6	27	4	47.033
	P- 85	28	1	53.720
	P- 80	29	5	56.766
	P-118	30	5	83.922

Division II

	R- 6	9	1	2.914
	R- 2	10	2	5.741
	R-21	11	3	12.663
	R- 3	12	1	14.552
	R- 1	13	2	15.737
	R- 5	14	5	21.553
	R-18	15	3	22.006
	R-14	16	2	74.965

No Sept. Report: International Paper Company, Livermore Falls and Riley Mills, P-64, P-124.

Report delayed, 1 mo. total only: Wrenn Paper Co., P-100.

Withdrawn: P-115.

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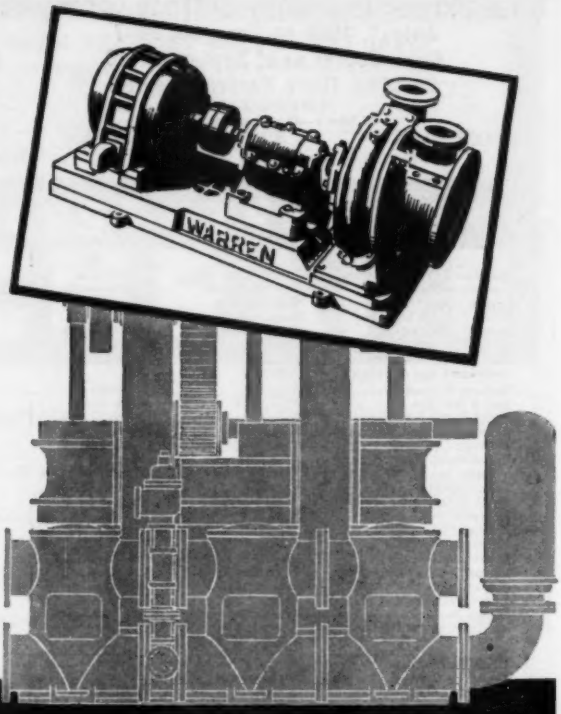

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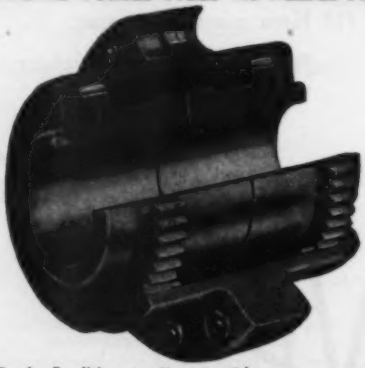

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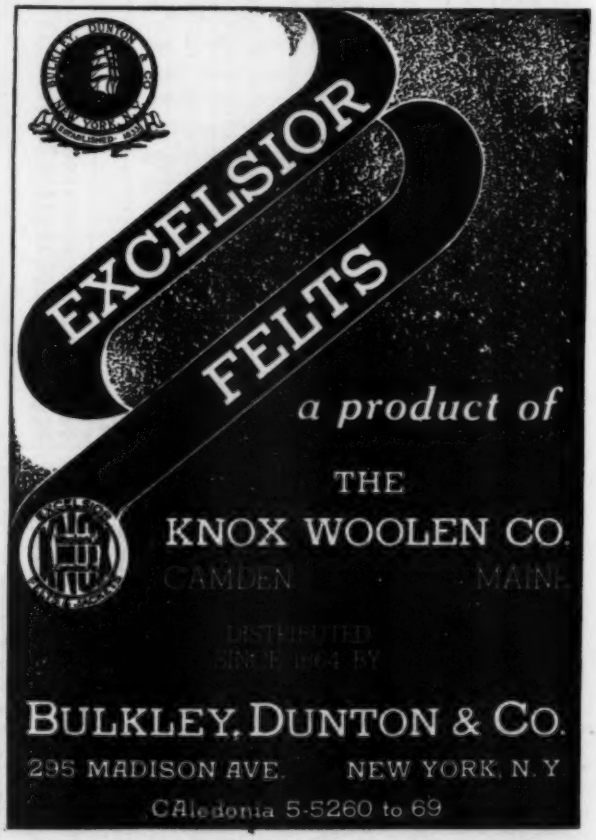

POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Difficulties of Waterwheel Regulation

As bitter experience has taught, speed regulation in hydro-electric plants is no joke, especially when big machines are operated in parallel. The fundamental difficulty is the sluggishness and immense inertia of the moving fluid, more particularly in the case of rather low-head installations, resulting in a time constant of regulation which is often inconveniently large.

In these days of sensitive relay governors a wheel at constant or slowly changing load can be held at constant speed very closely. It can even be set to hold speed quite accurately from no load to full load, as regards gradual change. But the more nearly it does this the more delicate must be the setting and the greater the danger of trouble in case of a quick change of load. If the governor is sluggish, the risk of pressure changes is reduced at the expense of varying speed; if it be quick-acting, it will hold speed better, but the stresses may become disastrously high, and when generators are operating in parallel there may be instability and hunting.

◆ BURNT OIL may be cleaned from the cylinder head of an engine by using strong lye-water, and, after it is cleaned, paraffine rubbed over the surface will keep it bright.

◆ Surface Condenser Maintenance

As a variation of an inch in vacuum at the turbine exhaust may make a difference of a pound or more in the water rate of a modern turbine, it is readily seen that maintenance of the condensing apparatus in the best possible operating condition is of vital importance to a power plant.

The first requirement in maintaining condensing efficiency is a means for knowing immediately when the vacuum falls below normal and to what part of the condensing apparatus the lowered operating efficiency is due.

For example, if the shut-off vacuum at the dry vacuum pump is low, the pump should be examined, the trouble located and necessary repairs made to bring its performance to normal. If the air leakage is high, the first opportunity should be taken to fill the condenser with water and locate and repair the leaks. The amount of air leakage which will begin to affect the vacuum varies, of course, with the type and size of air pump.

If the temperature rise of the circulating water is excessive, it indicates either that the circulating pump is not operating properly or that the tube sheets are covered with trash.

If the vacuum is still too low, even when the air pump pulls a good vacuum when shut off, and air leakage and temperature rise of circulating water are normal it will usually be found that there is some non-conducting material on the cooling surface. With some condensing waters this material will be soft mud which can be blown or brushed from the tubes.

◆ A SIMPLE RULE for tap drills is: Subtract the pitch of one thread from the tap diameter. On a 1-in. tap with 8-in. pitch, the tap would be 1 in. — ⅛ in. = ⅞ in. On a ⅜-in. tap, 16 pitch, it would be ⅜ in. minus 1/16 in. = 5/16". This allows fully as much thread as is necessary in most cases, and is easily remembered.

◆ Testing for Oil in Boiler Water

To test for oils and greases, put 250 cc. of cool water in a glass-stoppered bottle and add 50 cc. of ether. Shake well and allow to stand for 15 minutes. If oil or grease was present, the ether will have dissolved it and the oil-ether mixture will float on the surface of the water. Siphon off the water from beneath; weigh a porcelain dish carefully, then put in the remaining mixture and evaporate the ether by placing the dish in a bath of lukewarm water. This will leave the oil or grease in the bottom of the dish. Weigh again and the difference will be the weight of oil and grease per 250 cc. of water. Multiplying this value by 15.14 gives the amount of oil per gallon. Any amount which can be detected is undesirable and the water should be treated to remove it.

◆ Test of Fusing Point of Coal Ash

Tests to determine the fusing temperature of coal ash should be made by power-plant operators in addition to the usual tests to determine the amount of this ash. The reason for this is that if ash fuses and flows on boiler-furnace stokers it may cause serious trouble. Tests have indicated that the ash of good coal should not fuse at temperatures much below 2,500 deg. Fahr. (137 deg. C.). Coal of which the ash fuses at a lower temperature will very likely cause stoker operating difficulties.

The first requisite for this test is a source of heat, usually an oil-fired furnace, sufficient to attain temperatures up to about 3,000 deg. Fahr. (1,650 deg. C.). Samples of the ash to be tested are mixed with a small amount of 10 per cent solution of dextrine, which cements the ash particles together, making it possible to form the ash into small pyramids. These are allowed to dry, and the dextrine is burned off at a low heat.

In order that the temperature of the furnace may be known, so-called standard Seger cones are placed in the furnace along with the unknown coal-ash cones, and, in addition, temperatures are read by means of an optical pyrometer. Seger cones are made from known mixtures of refractory materials, each mixture having a fairly definite fusing temperature. The standard Seger cone and the unknown coal ash cones are laid in a horizontal position on the "fusion block," placed in the furnace and the furnace temperature is then gradually raised. When the standard Seger cone and the optical pyrometer indicate that 2,500 deg. Fahr. has been reached, the furnace is shut down.

When cold, the fusion blocks are removed and a study of the condition of the coal-ash cones is made. Coal of which the ash fuses completely can be eliminated from consideration; coal of which the ash if practically unaffected by heating at 2,500 deg. Fahr. may be considered satisfactory. Those coal ashes which show partial fusion must be carefully considered and, if there still is doubt, retested so that a final decision may be made.

◆ Neglect Reduces Safety Factor of Boilers

Soot deposits upon the dry surfaces of the boiler contain sulphur trioxide, which combines readily with moisture supplied from the air and the fuel and changes at ordinary temperatures to sulphuric acid. This acid reacts upon the boiler flues and headers and if allowed to remain will gradually waste them away and dangerously weaken them. Scale deposits, in addition to decreasing the conductivity of the material separating the water from the fire, also tend to overheat the metal, thereby reducing the boiler operating factor of safety. These reductions in strength of the metal parts of a boiler result in damage to heads, drums and wrapper sheets.

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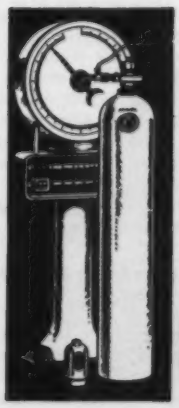

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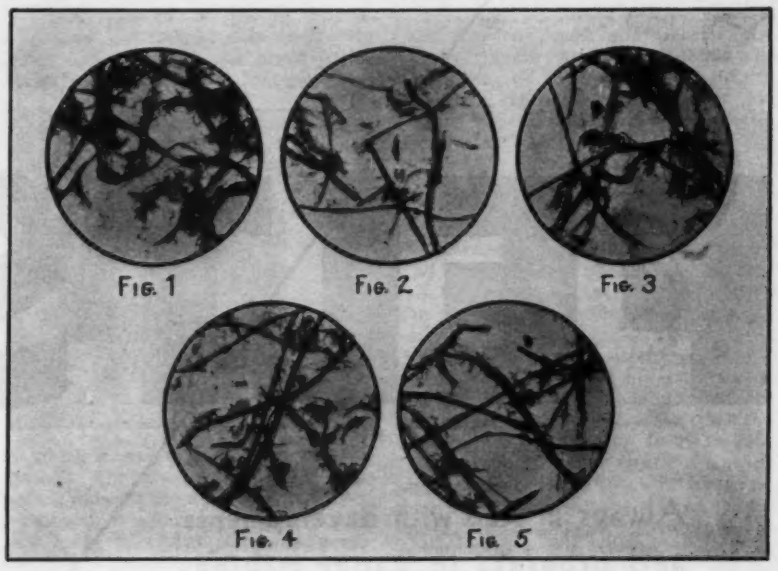
TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

IN THE PAPER INDUSTRY

◆ Degree of Beating, Fiber Measurement and Fractionation

This outlines an intensive study on two unbleached sulphite pulps which were beaten to 20 deg. S. R., 50 deg. S. R., and 70 deg. S. R. in two commercial mill beaters, one with stone tackle (A), the other with steel tackle (B), in a Rieth laboratory beater (C), in a Jockro mill (D), and in a ball mill (E). Fiber lengths were measured and fibers counted, and the parts by weight of individual fiber lengths were recorded in terms of the percentage of the total fiber originally present in the pulp. A similar series was made by using Hans Schmidt's technique of sieve analysis. In all cases the results have been compared graphically. Sample sheets were then made from the stocks obtained under the varying conditions of beating and their breaking length and bursting strength determined by the official German methods. From a large number of tests, the following conclusions were drawn: (1) the fibers are much more intensively and uniformly affected by laboratory equipment than by commercial beaters; (2) fibrillated fibers, even when short, are capable of yielding pulps of good strength; (3) smooth fibers, even when imbedded in fiber slime, give lower strength values; (4) excessive fibrillation of the surface of the fibers is detrimental to pulp strength; (5) with a knowledge of the distribution of fibers, the sieve analysis may serve as a measure of the degree of fibrillation, especially in the case of (B), despite the fact that with laboratory beaters fiber fractionation is still unsatisfactory. Detailed differences in beating work are described and shown by a series of photomicrographs (as well as the graphs above alluded to). As examples, in the case of the pulps beaten to 70 deg. S. R., Figure 1 shows the effect of (A); Figure 2 the effect of (B); Figure 3 the effect of (C); Figure 4 the effect of (D); and Figure 5 the effect of (E). M. Steinschneider, H. Kross and L. Imgrund: Papierfabr. 34, No. 23 (Tech. Teil.) 177-83 (1936).



◆ Coal Dust Motor

Attempts to secure independence for German power plants have focussed attention on the coal dust motors, which, despite certain inherent difficulties, are coming to serve as sources of energy when electricity, gas or water power are unavailable. Certain problems of the coal dust motor are still unsolved. The greatest difficulties lie in the wearing qualities of cylinders, piston rings, and valve champers. A specially resistant cast steel, originated by Schichau, leads to a ten-fold increase in the life of these parts. Coal or lignite may be used, but the ash content must be kept at a minimum. It is probable that, in the future, a fuel 80 per cent of which passes screen No. 70 (i. e., 4900 meshes per square centimeter) will be found suited to coal dust motor use. The so-called ash number of a brown coal from central Germany is 140-195 (i. e., in grams per 10,000 calories furnished by the fuel), but by suitable flotation processes this number may be reduced to 18 to 20. Finally through pressure extraction, purified coals can be obtained with 0.06 per cent to 0.1 per cent ash corresponding to ash numbers of 0.7-1.2. Cost of fuel for coal dust motors is well under that of oil for Diesel engines, but the latter are more readily maintained and the cost of lubricating them is also lower.—F. Schulte; Archiv. Wärmewirtschaft 16, No. 2, 35-38 (1935), through Papierfabr. (Abstracts) 34, Vol. 28, 145 (1936).

◆ Adsorption of Phenols and Hydroxycarboxylic Acids by Cellulose

In a previous research (Z. Angew. Chemie 40, 1218 ([1927]), it was shown that phenols in aqueous solution are taken up by cellulose. This depends on solution equilibria. As the number of hydroxyl groups increases, more of the phenol is adsorbed, but the relative positions of the hydroxyl groups appear unimportant (i. e., isomers show approximately the same adsorption in terms of millimols.) The investigation was extended to the pyrogallol tannins. In most of the investigations the cellulose material used was viscose; in a few instances, purified cotton. The results substantiate previous findings. Among the phenols newly studied were resorcin, hydroxyhydroquinone, phloroglucinol and resorcylhydroquinone. Constants and the coefficients of partition of each group are included. In contrast to the phenols, are the relative adsorptions of benzoic and phthalic acids, both of which are taken up by viscose, although an increase in the number of carboxyl groups shows a marked decrease in adsorption. Monohydroxybenzoic acids are also taken up by cellulose, but the introduction of one hydroxyl group has little influence, nor does the position of this hydroxyl group carry much weight. On the other hand, dihydroxy acids are adsorbed to a markedly higher extent. When a trihydroxycarboxylic acid is reached, however, the amount adsorbed decreases. Cellulose takes up digallic acid to a greater extent than all other compounds listed. With molar concentrations similar in the case of all solutions, the following figures represent adsorption in millimols per gram of viscose: phenol, 69; pyrocatechol, 106; resorcinol, 104; hydroquinone, 103; pyrogallol, 135; hydroxyhydroquinone, 137; phloroglucinol, 136; resorcylhydro-

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quinone, 216; benzoic acid, 427; salicylic acid, 375; m-hydroxybenzoic acid, 385; p-hydroxybenzoic acid, 400; protocatechuic acid, 637; alpha-resorcylic acid, 632; gentisinic acid, 634; gallic acid, 310; digallic acid, 1048; and phthalic acid, 178. These data do not check those of former investigators. Conclusions drawn from the present work are that gallic acid alone is not responsible for mordanting cellulose and that the dihydroxybenzoic acids may well form useful skeletal substances in the future synthesis of mordants and tannins.—Kurt Brass (with O. Gronych) Z. Angew. Chem. 48, 708 (1935) through abstracts of Papierfabr. 34, 149 (1936).

◆ Cigarette Paper

Two examples are cited: (1) The paper stock to be used in manufacturing cigarette paper weighing 15 grams per square meter is pretreated with 2 per cent water soluble potato starch (based on the dry weight of the paper). After leaving the paper-machine the paper is subjected to a fine spray of a mixture of tartaric acid and eugenol, so that each square meter of the sheet retains 0.7g of the acid and 0.5g of the eugenol. (2) The stuff is treated with 5 per cent of cellulose dextrin (obtained by HCl hydrolysis). After the sheet is completed it is treated with an emulsion of gum mastic and oxalic acid, so that each square meter of the paper contains 2.5 grams of the acid and 0.8 grams of the gum.—Walter Wittelsbach: German Patent 629,751 (through Wochenbl. Papierfabr. 67, No. 28, 523).

◆ The Currier Size Tester

This piece of apparatus is essentially that invented by L. C. Currier (British Patent No. 403,304). The halftone in Figure 1 shows the tester, which is a device for wetting one side of the sample to be tested, until sufficient water has penetrated to allow an electric circuit (containing an amplifying valve) to be closed. This end-point is shown on a meter. The test sample, placed on a metal plate, is treated with moisture supplied by a circular felt (area, one square inch), which, backed by a coarse Monel wire screen, is kept saturated with distilled water flowing from an inverted bottle, by means of a specially devised cap. Plate and felt are connected electrically to the indicating circuit. The time elapsing between the instant that the sample is wetted and the moment that the milliammeter needle passes a certain (arbitrary) end-point, is an index of the degree of sizing of the sample. The instrument makes two circuits available: (a) for normally sized paper (i. e., hard sized circuit) and (b) for poorly sized paper (i. e., slack sized circuit); (b) is seldom used. Detailed accounts are given for the precautions required in the use of the Currier instrument. In papers which contain carbon-black (etc.), and which behave as conductors, an insulating grid paper made of mitsumata fiber is used as auxiliary. This is exceedingly thin, perfectly insulating, and is placed between the plate and the sample to be tested. It is, however, so water-pervious that as soon as the moisture has penetrated into the sample only a very slight further resistance to water flow ensues. Due allowance may then be made for this slight, constant time lag. A thorough study was made of the correlation between the dry indicator method of the T. A. P. P. I. and the Currier size test. The latter always gives the lower sizing values. This is shown in two tables,

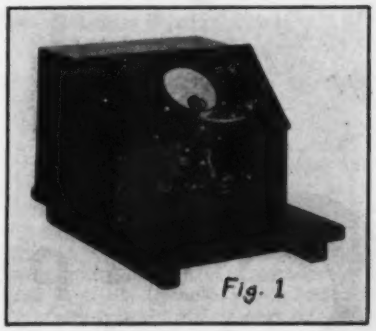
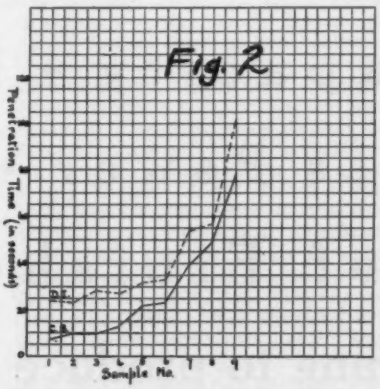


Fig. 1

in which a wide range of papers was studied. Figure 2 shows a graph illustrating some of these differences in penetration time. Here the numbers indicate: (1) a glazed imitation parchment, (2) glazed kraft, (3) glazed casing, (4) glazed unbleached sulphite, (5) unglazed kraft, (6) unglazed kraft, (7) m. g. kraft, (8) unglazed bleached sulphite, (9) m. g. kraft. The lower values shown by the Currier test are attributed (a) to the fact that this test allows the so-called skin resistance to be overcome more readily than in the case



of the dry indicator method; and (b) to the fact that penetrated moisture is detected more rapidly. The end point is reached before penetrated water becomes visible. Ratios of the dry indicator method (D. I.) to the Currier sizing test (C. S. T.) vary from 1.17 for unglazed bleached sulphite paper to 3.58 for glazed imitation parchment. These variations are discussed. There appear to be two stages in the Currier apparatus, which seems capable of distinguishing between the penetration of the skin (surface) of the paper, where plastic flow occurs, and penetration of the inner structure. Variables were also investigated. These included (a) volume of water in the bottle (used in moistening the felt); (b) area of contact of felt and paper; (c) effect of hard water; (d) temperature of water; (e) temperature of plate; (f) effects of variation in relative humidity; (g) effect of electrolytes. In the last instance, it was shown that notwithstanding the high conductivity of penetrating salt solutions used, the Currier size values remain almost unaffected by their use. F. D. Broadbent, C. Brown, and H. A. Harrison: Paper-Maker and British Paper Trade J., 92 (Tech. Sect.) 109-111; 117-119 (1936).

◆ Influence of Sodium Sulphite and Sulphide on Straw Pulping

A three-hour cook of straw was carried out at 155 deg. C. with each of the following in equivalent amounts: NaOH (18 per cent of the bone dry weight of straw), Na_2S, and Na_2SO_3. Na_2SO_3 gives the highest yield (about 54 per cent), while NaOH gives the lowest. Na_2SO_3 also causes the least degradation of the pulp. The yields are increased when the temperature of digestion is lowered to 140 deg. Na_2S cooks give the slowest pulps, Na_2SO_3 yields the least hydrated material. The pulps least colored are obtained with Na_2SO_3 or sulphite-sulphide combination cooks. When Na_2SO_3 is used in conjunction with alkali, the sodium salts of the lignosulphonic acids are formed. The pentosans appear to be chemically modified during the cook. Straw pulp delignified with alkaline liquors is not readily bleached. The higher the temperature of the cook, the more difficult is the bleaching problem. The only advantage in the higher temperatures of digestion is manifested when Na_2SO_3 is used, and taken all in all the best pulps are obtained with Na_2SO_3 at temperatures of 140-155 deg. C., where an individual reagent is involved. However, judicious mixtures expedite the delignification. The cooking liquors containing reagents of which sulphur is a component are oxidized. This may cause degradation of certain organic components of the straw.—Dolgow, Bumaschnaja Promischlennost, 14, No. 10, 21 (1935); through Papierfabr. 34, No. 28 (abstracts), 147.

◆ Effect of Sulphite Liquors Containing Selenium

This is Hägglund's 32nd publication on the chemistry of sulphite digestion. The formation of sulphates decreases with increasing lime content of the liquor. This is true for pure sulphite liquor as well as for liquors containing selenium. It depends on the fact that the rate of the conversion of thiosulphate (through the pentathionate) into sulphate decreases with decreasing hydrogen-ion concentration. Consequently in a liquor relatively high in basic content, a certain amount of thiosulphate is permissible. In the preparation of sulphite pulps with controlled sulphite liquors (to which

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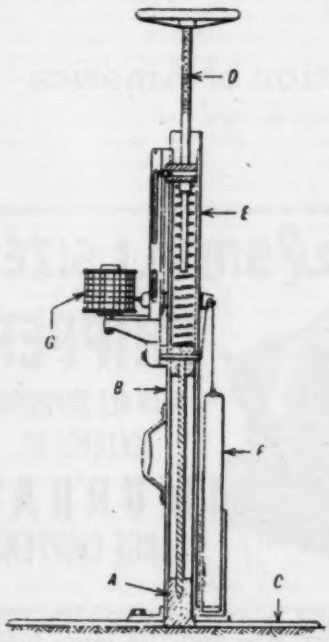
various amounts of selenites have been added), it was shown that the selenium content, in order to be actually injurious, must be considerably higher than is generally supposed. With a selenium content of 0.75 mg. per liter of cooking acid there is no appreciable decrease in the pulp strength. Such a decrease becomes manifest, however, when the selenium content reaches 1-2 mg. per liter. Furthermore, other substances, normally foreign to the liquor, may influence the deteriorating action of the selenium. This accounts for the previously reported practical results which indicated that a selenium concentration of 0.2 mg. per liter led to spoiled cooks. E. Hägglund, C. H. Bäckström, Maden, Karanovic, Lars Runquist and Olof Vincent. Papierfabr. 34, No. 22 (Abstracts) 108 (1936).

◆ A Geoptosimeter

This instrument shown in the figure is used in determining rapidly the bearing strength of any ground to be used as a foundation for buildings. It is the invention of Constant Van der Meer, a Belgian. A recording drum (G) is



mounted on the vertical slide, and in this way a graph is obtained. The observer, operating the instrument, stands on the baseplate (C) and operates the screw (D) through the handwheel. This forces down the spring on a plunger. The maximum pressure obtainable is 115 lb. per square inch.—Engineer; Paper-Maker and British Paper Trade J. 91, 84 (Technical Supplement) (1936).

◆ Chips from Resin to Soap Formation

After rosin extraction, the residual wood was delignified to determine its pulping qualities. These are laboratory experiments. The chips, free from sawdust, were given a sulphate cook (the liquor corresponding to 15-25 per cent Na_2O), for 3-5 hours at 172 deg. C., with two hours of preliminary heating to attain this temperature. While the resultant pulp may be bleached, its strength is inferior to the usual sulphate pulp. To obtain a uniform pulp, the chips must be screened. The pulp utilization is limited to inferior grades of paper.—Sotow; Pumaschnaja Promischlennost, 14, No. 9, 45 (1935) through Papierfabr. (Abstracts) 34, 146-7 (1936).

◆ Possible Papermaking Woods from Guiana

This is a brief collective monograph of experiments undertaken at the School of Papermaking at Grenoble (which has tested out innumerable French Colonial woods for their suitability in pulp manufacture), at the Papeteries Navarre, and also by Arthur Bastos at Para Industrial School in Brazil. The work lends little immediate encouragement to the papermaker seeking to utilize Guianan woods; however, it states frankly that as only light-colored, lightweight woods have been studied to date, further research is in order. Usually the fibers are short and the pulps of limited value. The woods studied for their pulpmaking qualities were: the so-called Guianan Cork wood (bois bouchon) which has not been botanically classified; Avicennia nitida Jacq.; Cecropia peltata L.; Eriodendron anfractuosum DC.; Guazuma ulmifolia Lam.; Jacaranda Copaia D. Don; Vochysia vismiæ folia Warm.; Ilex casiquiarensis Loes.; Simaruba amara Aubl.; Couralia fluviatilis Splig.; the indeterminate mahot wood; Pachira aquatica; Didymopanax Morototoni Aubl.; Ocotea Guyanensis Aubl.; Simaba Guyanensis Aubl.; Bombax Munguba Mart. et Zucc.; Calycophyllum spruceanum Benth.; Cochlospermum orinocense (Steud); Fagara rhoifolia Lam., and Acacia polyphylla D. C. Of these, some are doubtful species in French Guiana, although these are certainly indigenous to the neighboring Amazon basin. Of the trees listed above, the following could be used admixed with other pulps: Avincennia nitida Jacq.; Cecropia peltata L., which is obtained in 40 to 45 per cent yield; Jacaranda Copaia D. Don; Vochysia vismiæ folia Warm.; Ilex casiquiarensis Loes.; Ocotea Guyanensis Auble.; Simaba Guyanensis Aubl.; Bombax Munguba Mart. et Zucc.; and Calycophyllum spruceanum Benth. Bastos claims that Pachira aquatica, which gives pulp yields of only 36 per cent, might, because of its accessibility and rapid growth, merit exploitation. Bombax Munguba Mart. et Zucc. has a value similar to that of Pachira aquatica.

The extensive forests in Guiana and near the Amazon make further research imperative. The original article contains 10 illustrations and a bibliography of recent work on Brazilian and Guianan woods. L. Vidal. Le Moniteur Papeterie Francaise 73, No. 13, 302-309 (1936).

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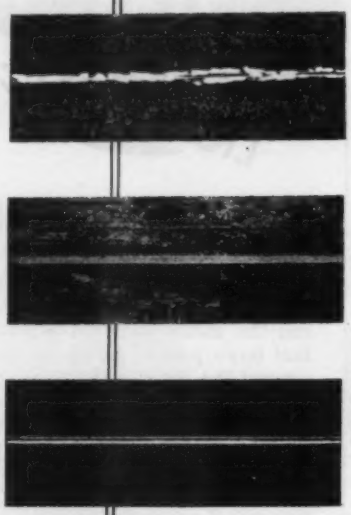

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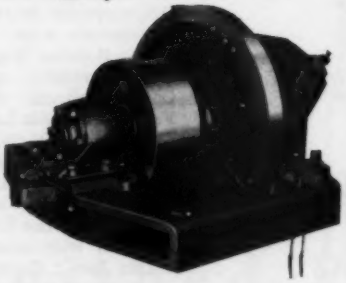

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PAPERMAKING PATENTS

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Compiled by James Atkins, Registered Patent Attorney

2,046,614—Method of Preventing Slime Growth in Paper Making Processes. Pierre Drewsen, Sandusky, Ohio, assignor to The Hinde & Dauch Paper Company, Sandusky, Ohio, a corporation of Ohio. Application December 4, 1935. Serial No. 52,930. 5 Claims. (Cl. 92—21). In a paper making process, the step of introducing caustic alkali into mill waters to an extent sufficient to inhibit the growth of biological slime formations detrimental to the operation and in a concentration of not less than one pound of the caustic alkali to ten thousand pounds of water in excess of the amount of alkali necessary to neutralize the natural hardness of the water used.

2,046,763—Paper Product and Method of Making. Benjamin Asnes, Quincy, Mass., assignor to Dennison Manufacturing Company, Framingham, Mass., a corporation of Massachusetts. Application December 28, 1931. Serial No. 583,487. 2 Claims. (Cl. 91—68). A sheet of creped tissue paper for use as diaper linings and the like characterized by alpha cellulose fibers in open formation, the fibers throughout the sheet being bonded together at their junctions with a thin film of albuminous adhesive which is temporarily water-resistant for several hours, the sheet containing a softening agent in amount at least of the order of three times the amount of albuminous adhesive, and the interstices between the fibers being open, whereby the article is characterized by thinness, softness, flexibility, porosity, and high wet strength.

2,047,422—Fourdrinier Paper Making Machine. Bernard A. Malkin, Lachine, Quebec, Canada, assignor to Dominion Engineering Works Limited, Lachine, Quebec, Canada. Application March 22, 1934. Serial No. 716,866. 13 Claims. (Cl. 92—44). A Fourdrinier paper machine equipped with a laterally movable table structure rollers mounted independently of the table and arranged to support the table in either an operative or a laterally displaced position and further rollers beneath which portions of the movable table structure are engaged to prevent tilting of the table during its lateral movement to and from an operative position.

2,047,488—Wood Pulp Making. Peter A. Paulson, Appleton, Wis. Application May 21, 1934. Serial No. 726,646. 10 Claims. (Cl. 92—11). The process of making wood pulp which consists in supplying to the inlet end of an elongated receptacle, a mixture of wood chips and a base-containing liquid conducting said mixture through said receptacle, introducing acid gas into said receptacle at a point spaced from the chip inlet, permitting the escape of gases to prevent the development of excessive pressure within the receptacle, discharging the treated material from the other end of the receptacle, propelling cold acid gases to an acid absorber, withdrawing cold acid liquid from said absorber, heating said acid liquid by passing the same through a heat exchanger, delivering the heated acid to a separator for separating acid gas from said heated acid liquid to provide a supply of said acid gas for introduction into said receptacle, passing hot liquid from said separator through said heat exchanger for heating some of said acid, and introducing the hot liquid after passing through said heat exchanger to said acid absorber.

2,047,542—Drier Felt for Paper Machines and the Like. William A. Barrell, North Andover, Mass. Application February 13, 1933. Serial No. 656,446. 8 Claims. (Cl. 139—410). A drier felt for paper machines comprising two complete plies constructed each of interwoven warp and filling strands, and binder strands supported externally on the exposed parts of the warp strands on the outer face of one ply, whereby they overlie and protect the warp strands of that ply, and having loops at intervals extending through the felt in interlocked connection with strands of the other ply to exposed points on the outer face of the latter ply.

2,047,552—Paper Folding Mechanism. William Fairchild, Albany, N. Y., assignor to A. P. W. Paper Co. Inc., Albany, N. Y., a corporation of New York. Application January 4, 1935. Serial No. 370. 4 Claims. (Cl. 270—71). In combination with a rotary pinch roll of a paper folding machine having a longitudinal recess in its peripheral portion equipped with a pinch blade supported on a holder journaled in said roll so that the pinch blade is rockable between the front and back walls of the recess, a spiral gear segment carried on the pinch blade holder exposed at one end of the pinch roll, a second spiral gear segment at the same end of the roll in mesh with the first segment, said second segment being supported for longitudinally reciprocating, non-rotary movement relatively to the first segment, said second segment being spring-pressed into a normal position further away from the end of the roll, and a reciprocating member supported independently of the roll timed with the rotation of the roll to come into yielding cooperation with the second segment to press it inwardly relatively to the roll and the first segment with resultant rotation of the latter.

2,047,610—Drier Felt for Paper Machines and the Like. William A. Barrell, North Andover, Mass. Application September 21, 1933. Serial No. 690,376. 10 Claims. (Cl. 139—410). A drier felt for paper machines comprising two plies constructed each of interwoven body warp and filling strands, binder strands interwoven with body strands of both plies and supplemental warp strands equal in number to all of the body warp strands of either ply, each passing over all the filling strands of the face ply and having loops passing between all the body warp strands of both plies and being interlocked with filling strands of the back ply as originally woven; the parts of the supplemental warp strands which lie in the paper-contacting face of the felt being supported by the contiguous body warp strands so that they protrude beyond said body strands in said paper-contacting face.

2,050,486—Apparatus for Testing the Smoothness of Paper. Myrl N. Davis and Homer E. Malmstrom, Appleton, Wis., assignors to Paper Patents Company, Neenah, Wis., a corporation of Wisconsin. Application August 1, 1934. Serial No. 737,967. 3 Claims. (Cl. 88—14.) Apparatus for measuring the smoothness of a paper surface, comprising a glass block having a light reflecting base surface on which a paper sheet to be tested is laid and oppositely beveled edges each at an angle of 45 degrees to said base surface, means for pressing said sheet on said base surface, means for projecting a light beam normal to one of said beveled edges through said block onto the paper-glass interface, and means for measuring the intensity of the reflected beam of light emerging from the other of said beveled edges.

2,050,749—Pulp Grinder Temperature Control System. Clayton D. De Mers, Rochester, N. Y., assignor to Taylor Instrument Companies, Rochester, N. Y., a corporation of New York. Application July 25, 1933. Serial No. 682,095. 6 Claims. (Cl. 83—75.) 1. The method of producing wood pulp of uniform quality and a consistency varying within a negligible range by grinding the wood on a water-cooled stone, which comprises holding pieces of wood against the grinding surface of said stone, applying cooling water to the stone in amounts proportional to the increase in surface temperature of the stone and inversely proportional to the decreasing sharpness of the stone.

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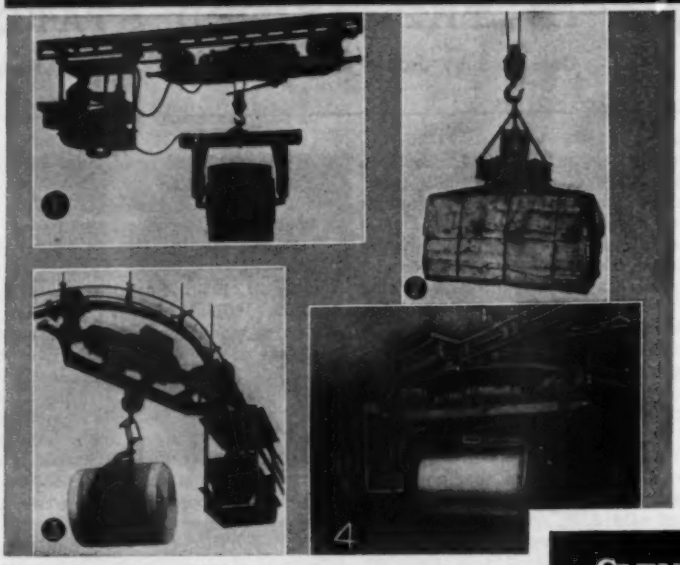

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The COMMERCIAL OUTLOOK

New York, November 2, 1936.

ALONG with other basic industries of the country, the paper industry is forging ahead at an excellent pace, developing broad activity and showing an all around healthier condition than in years. The further increase in business activity in recent weeks has been nothing short of surprising. In the midst of a nationwide political campaign and on the eve of a national election, industry has gone on gathering activity momentum, seemingly entirely oblivious to the political battle, in the very time which in the past has in most cases proved a period of unsettlement, apprehension and business decline. This, in the estimation of many, attests to the soundness of the present situation.

Indices show that business and industry in the United States have at last regained the heights of the halcyon days of 1929—the target aspired for during the last year or more, and hopefully looked forward to in the dismal first years of the depression. Almost every set of statistics show the various manufacturing industries operating and producing at close to record levels; that the movement of products is taxing the transportation facilities of the nation, and that wholesale and retail trade have leaped ahead with such strides that an actual shortage of many articles really exists. Commodity markets now definitely are sellers' markets, with buyers on the run and very much worried where they can secure wanted supplies.

The theory is advanced, and logically, that if the industrial and business situation can register such pronounced improvement in the weeks preceding a national election, certainly the improvement should continue. There is a feeling common in trade circles that the present cycle of business gains has a considerable time yet to run, and that the country is well on the road to a period of unsurpassed manufacturing and commercial activity. As far as paper and board manufacturers are specifically concerned, they are already in the midst of a market condition necessitating full operation of their mills, or very close to maximum operation. Demand for paper of practically all classes has shown additional expansion, and it is no exaggeration to say that many paper and board mills are sold up to an extent where they are scarcely able to accept orders for a time.

"Surging ahead with 10 to 12 per cent gains over 1935, the paper industry will break all previous production and sales records this year," states Charles H. Boyce, secretary of the American Paper and Pulp Association, in a survey of business conducted by one of the metropolitan dailies. "Paperboard and wrapping papers have shown the greatest gains, reflecting the increased shipping and retail activity. Employment is at the highest rate in the history of the industry. About $100,000,000 is being spent this year for new plants and for rehabilitating old ones."

A gratifying feature is the strengthening of prices on some classes of paper and board. For a while prices of everything in the form of raw materials for paper mills were advancing, and rapidly, whereas prices of the finished product remained still. Now the increased costs of manufacture are having influence enough to elevate prices of at least some kinds of paper and board. Wrapping paper has risen fairly sharply, and there has been an advance of $2.50 per ton in boxboards. Other lines exhibit a strong advancing tendency, more particularly bristol boards and rag-content papers.

Newspaper advertising for September showed more than a normal gain, according to Printers Ink. The increase of 2.4 per cent over August was regarded as "exceptional" as the index is corrected for seasonal variation. The rise over September, 1935, was one of the largest for this year, amounting to 15.1 per cent. For the first nine months of this year, newspaper advertising registered an increase of 9.4 per cent over the corresponding 1935 period.

Newsprint production in Canada continued to mount in September, while the output in the United States showed but slight change. Where Canadian output increased 20.5 per cent over the same 1935 month, that of the United States gained only 1.1 per cent, and both countries showed a combined gain of 15.8 per cent, according to the figures reported by the News Print Service Bureau. Canadian production was 269,782 tons in September, compared with 223,892 tons in the similar month last year, and output of United States mills was 72,216 tons, against 71,416 tons. Production of both countries totaled 341,998 tons, as contrasted with 295,308 tons in September, 1935. For Canada, output continued to set new monthly high records, with the total for the first nine months of the year also well above any previous record. United States mills, however, ran far behind the record of a decade or so ago.

Canadian mills produced 2,303,725 tons of newsprint in the first nine months of 1936, a gain of 325,091 tons or 16.4 per cent over the same period of 1935. The output in the United States was 679,389 tons in the nine months, a decrease of 1,874 tons or 0.3 per cent compared with last year. Total North American newsprint output was 3,224,599 tons in nine months this year, a rise of 314,120 tons or 10.8 per cent over the same 1935 period. Stocks of newsprint at Canadian mills were reported at 65,989 tons at the end of September, and at United States mills, 17,397 tons, making a combined total of 83,386 tons, compared with 86,543 tons on August 31 this year, and 90,192 tons on September 30, 1935.

Production of paperboard in the United States recorded an appreciable increase in August over the preceding month and also the same month last year. A total of 319,391 tons of board of all kinds was produced in August, comparing with 299,033 tons in July this year and 291,127 tons in the similar 1935 month, according to the monthly summary of the U. S. Bureau of the Census, in cooperation with the National Paperboard Association. Mills produced at 76.7 per cent of their rated capacity in August, against 69.7 per cent in July last and 68.7 per cent in August a year ago.

The August output brought the total for the first eight months of this year up to 2,318,854 tons of board, compared with 2,120,979 tons in the corresponding period in 1935, and 1,893,213 tons in 1934. New orders received by manufacturers in August called for 332,553 tons of board in August, against 304,747 tons in the month preceding and 297,349 tons in August last year, while unfilled orders at the end of August called for 117,443 tons, compared with 101,557 tons a month before and 86,767 tons a year ago.

Shipments of prepared roofing from manufacturing plants in the United States increased in August last to a total of 2,994,353 squares of all types of the product, according to the Census Bureau's monthly report, against 2,508,716 squares shipped in the preceding month and 2,684,693 squares in August, 1935. Eight-month shipments this year totaled 19,938,116 squares, compared with 16,905,348 squares in the same time of 1935, and 16,505,380 squares in 1934.

◆ ◆

◆ RILEY STOKER CORPORATION announces the appointment of Robert Jory as sales engineer with headquarters at the New York office. Mr. Jory is a licensed professional engineer for the states of New York and New Jersey and has had broad experience in the design of large boilers, both abroad and in the United States.

◆ Sherwin-Williams Announces Promotions

Announcement is made that H. D. Whittlesey, first vice president and director of sales and distribution of the Sherwin-Williams Company, will give up the duties of director of sales and distribution and will devote his entire time to executive duties and to the interests of the company's allied connections.

Vice President A. W. Steudel becomes vice president and general manager. K. H. Wood becomes director of sales and distribution.

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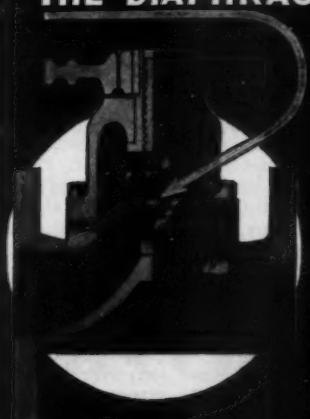

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VALVES

Domestic RAW MATERIALS

◆ Old Paper

There has been a near-scramble among paperboard manufacturers recently for waste paper. Demand has been exceedingly active and the market has stiffened at a rapid pace; prices now are on higher levels than have been known in a lengthy while, and as yet there has been no indication of any recession even though waste paper usually eases toward the close of the year. Buying has covered all grades, and there seems no denying the fact that available supplies have scarcely proven adequate to consumers' requirements.

No. 1 mixed paper is up to 42½ cents per hundred pounds in the East f. o. b. shipping points, folded newspapers at 52½ cents, old corrugated boxes at 52½ to 55 cents, overissue news at 62½ cents, and boxboard cuttings at 45 cents. Book stock has scored a sharp rise in price to 75-80 cents per hundred pounds for No. 1 heavy magazines at points of shipment, while No. 1 old kraft paper is 1.15 to 1.25 cents a pound, white news cuttings 1.25 to 1.35 cents, white ledgers 1.15 to 1.25 cents, colored ledgers 85 to 90 cents per hundred, No. 1 hard white shavings 2.15 to 2.40 cents, No. 1 soft white shavings 2 cents up to 2.40 cents for one-cut quality, and No. 1 hard white envelope cuttings 2.55 to 2.65 cents.

◆ Papermaking Rags

Papermaking raw materials of virtually every description are showing much strength, and gradually climbing to higher price levels. Pulp, rags, rope, waste paper, chemicals; in fact, almost every material paper and board manufacturers buy and consume are in active demand and in a firm supply position, with quoted prices pointed strongly upward. Buyers are on the defensive; sellers are "sitting in the saddle," as the saying goes, for the first time in a long while.

In papermaking rags, it can be stated practically all classes of rags, new and old, are moving forward in value under a brisk call for supplies and a distinctly bullish statistical situation. Consumption is mounting, and from all signs and reports has reached a higher level than in years, more especially as concerns roofing stock and some grades of new cuttings. It is no longer an easy matter for manufacturers to locate desired amounts of many kinds of rags.

Roofing grades are in the vanguard of the demand for papermaking rags, and the uptrend in prices of these rags is carrying along with it most other classes of stock. Prices of roofing rags in the East now show an advance of more than half a cent per pound, or $10 a ton, within the last three months. Eastern dealers report sales of No. 1 domestic roofing stock or satinet garments at 1.90 cents a pound, if not higher, f. o. b. shipping points, and of No. 2 roofing or mixed satinets at 1.60 cents. Foreign dark colored cottons, which correspond with our mixed satinets, have been sold freely at 1.85 and 1.90 cents ex dock American Atlantic seaboard, and it seems extremely doubtful whether further purchases could be effected at these prices. In fact, dealers and importers are demanding higher for all kinds of roofing rags, since costs to them of both domestic and foreign material have increased further.

New No. 1 white shirt cuttings are held firmly for 8 cents per pound at dealers' shipping points, new unbleached muslins at 8.50 cents, light silesias at 6.25 cents, light flannelettes at 6.75 cents, bleached canton flannels at 7.75 cents, new white canvas cuttings at 7.75 cents, fancy shirt cuttings at 3.50 cents, washables at 3 cents or close to that figure, and new white linen cuttings at 11 to 11.50 cents. It is nothing out of the ordinary for sellers to ask above these prices, and to manifest scant disposition to accept orders at less than the values demanded.

Old No. 1 repacked whites are quoted at 3.75 cents and more, depending on the quality of packing, f. o. b. shipping points, No. 1 miscellaneous whites at 3.25 to 3.50 cents, and repacked thirds and blues at 2 cents or higher. Twos and blues are about 2.25 cents at shipping points.

◆ Rope and Bagging

Dealers stress the high prices they are obliged to pay for old rope at sources of supply, here and abroad, and are raising their quotations to paper mills. Most consumers seek to buy No. 1 old manila rope at 2.75 cents per pound f. o. b. shipping points or ex dock American Atlantic ports, but in all probability sales have been made at a higher level. Importers declare they are quoted 2.85 cents as about a minimum and beyond 3 cents from abroad for No. 1 old rope. Dealers who have sold domestic old manila lately at 2.75 cents a pound now are asking higher. Old strings, including sisal, jute and mixed, are in steady demand and firm in price.

Bagging is relatively quiet other than roofing bagging, but dealers anticipate a spurt of demand soon and are accepting orders from consuming customers cautiously. Roofing bagging has been reported sold at 1.60 cents per pound for foreign ex dock New York, and about 1.45 cents for domestic f. o. b. shipping points. No. 1 scrap burlap is nominally 1.80 to 1.85 cents a pound at shipping points though higher is generally asked for foreign. Importers assert they cannot afford to sell No. 1 foreign gunny bagging under about 2.10 cents ex dock basis as they are asked at least 2 cents by shippers abroad.

◆ Pulpwood

Pulpwood is in consistently good demand and firm quotably. Pulpmakers are taking contract supplies freely and show eagerness for additional lots. Reports say large cuts are being made in the Canadian woods this season, and imports into the United States are registering a substantial increase. Prices exhibit a hardening trend.

◆ Mechanical Pulp

Domestic producers of groundwood have very little of their output to offer for sale, and consequently business in the domestic product in the open market is of small importance. The market in general is firm, and while consumers are buying in a reserved manner endeavoring not to excite matters, there is nevertheless a good and consistent demand. Those on the selling side of the trade are looking forward to an active and very strong market this winter, on the theory that consumption is heavy and probably will rise whereas producing mills are well sold for some time to come. Domestic groundwood is nominally around $28 or $29 per ton delivered at consuming centers, or on a range of about $27 to $32, depending on the haul from grinding plants. Canadian groundwood is $23.50 or higher per ton ex dock New York or other U. S. Atlantic ports for pulp brought down by schooners, and Scandinavian groundwood is $26 to $27 ex dock New York for dry.

◆ Chemical Pulp

The principal item of interest in the domestic chemical pulp trade at present is what price domestic manufacturers will ask for bleached sulphite after the turn of the year or for the first quarter of 1937. Foreign sulphite has advanced quite rapidly and is now well above the quotable level on the domestic product. It is believed domestic producers will raise their price at least $2 to $3 per ton over the present basis of 2.65 cents a pound ex dock American Atlantic seaboard for prime grades of bleached sulphite. Unbleached sulphite is firm at around 1.85 cents a pound for newsprint grade to 2 cents and higher for the better qualities, while bleached soda pulp is 2.60 cents delivered paper mills, and domestic kraft pulp nominally 1.90 to 2.25 cents f. o. b. producing points.

◆ Chemicals

Paper manufacturers are commencing to contract for chemicals for next year. The market is firm, with all items holding to fully maintained quotable levels and in frequent instances evincing a tendency to advance.

◆ ◆

◆ ANNOUNCEMENT is made that method and apparatus patent of Brown Company, No. 1,653,125 dealing with Automatic Freeness Drainage Control is now open to the Paper Industry. Arrangements have been completed whereby Paper and Industrial Appliances, Inc., of New York with co-operation of Lewellen Manufacturing Company of Columbus, Indiana, will manufacture and sell equipment under license of the Brown Company.

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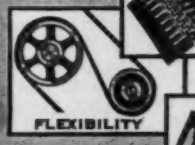

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Import and Export MARKETS

IMPORTS

◆ Wood Pulp

Pulp producing mills in Europe and Canada are sold out for next year. This flat statement is as near accurate as almost anything could be. It is possible, of course, that some manufacturers abroad will still have some wood pulp to sell before the end of 1937, but the fact is that they have contracted for virtually their entire output over the coming year.

There is no doubt considerable more pulp could readily be sold if producers had it to offer. There is a brisk inquiry for additional supplies. While paper and board manufacturers in the United States have covered the great bulk of their anticipated requirements, in a large majority of cases, there remain some who haven't secured all the supply desired and who are eagerly seeking to purchase more pulp. Not in a long, long time have consumers been so willing to buy, and for a lengthy period ahead. The demand is spreading over into 1938, but foreign producers in a preponderance of instances are not disposed to commit themselves so far into the future.

The market for imported wood pulp is strong to an extreme. Pulp importers and agents at New York assert they could easily sell thousands of additional tons of chemical pulp for shipment during 1937, and also in 1938, if they could induce manufacturers in Scandinavia and elsewhere outside the United States to provide the necessary pulp for sale. Prices of chemical pulp have assumed a position of secondary importance to that of locating available supplies. Consumers in this country evidently believe that market prices are as low as will be seen for some time.

About the minimum price reported prevailing on foreign prime bleached sulphite for next year is 2.90 cents per pound ex dock American Atlantic seaboard, and this price is mainly nominal since so little sulphite is to be had. Quotations range up to 3.25 cents and higher, depending on the pulp concerned. No more foreign prime unbleached sulphite is said to be available at the former price level of 1.90 to 1.95 cents ex dock American Atlantic ports; quotations on such pulp start from about 2 cents and range upward. Easy bleaching grades are 2.15 to 2.20 cents nominally, to higher for the extra desirable mill brands. Prime Scandinavian kraft pulp is nominally 2.10 to 2.30 cents a pound dock basis. Sales of near or fairly near deliveries have been reported at 2.25 cents, and it is said some consumers doubtless would gladly pay this price, if not more, for any prime kraft for delivery over the next eight to ten months, or all of next year. Foreign groundwood is quoted at $26 to $27 per short ton ex dock American Atlantic seaboard for dry, and approximately a dollar less for moist. Groundwood also is in a sold-up position, and offered sparsely.

Imports of wood pulp into the United States were on a high level during August, and came near to reaching the record importations of the commodity into this country in any single month. A total of 198,511 short tons of 2,000 pounds, air dry basis, of chemical pulp was imported in August, valued at $7,384,204, as contrasted with 185,218 short tons of a declared value of $7,039,547 in the month preceding, and 135,508 short tons of a value of $5,344,071 in August, 1935, according to U. S. Department of Commerce figures.

The August receipts brought the total chemical pulp imports in the first eight months of the current year up to 1,314,157 short tons, against 998,156 short tons in the corresponding period last year.

Mechanical pulp imports in August were 17,723 short tons, valued at $318,719, making a total for eight months of this year of 133,922 short tons, compared with 102,852 tons in the similar 1935 period.

◆ Paper Stock

Imports of paper base stocks into the United States continued on a high level in August compared with a year ago. Rag receipts were 26 per cent greater than last year, and pulpwood imports showed a 50 per cent gain. Papermaking rag arrivals amounted to 25,726,385 pounds for a declared value of $358,964 in August, against 20,429,055 pounds of a value of $315,778 in the same 1935 month, and made a total for eight months this year of 201,243,307 pounds of a value of $3,164,287, as compared with 114,245,583 pounds of a value of $1,347,086 in the same period last year. Miscellaneous paper stock imports, comprising old rope, scrap bagging, waste paper, etc., were 6,447,743 pounds in August, valued at $124,606, bringing the total for eight months up to 72,676,618 pounds of a value of $1,222,985, against 49,770,899 pounds of a value of $707,093 in the first eight months of 1935. Pulpwood imports in eight months this year totaled 789,009 cords for a value of $6,187,693, contrasted with 683,838 cords of a value of $5,083,419 a year ago.

◆ Paper

Imports of newsprint and other papers into the United States continue higher than for some years. August receipts of newsprint totaled 246,186 tons as against 195,052 tons in the corresponding month last year. Paper imports for the month reached a total valuation of $9,966,096, of which $8,697,144 represented newsprint, and $1,268,952 all other classes of paper and board and converted paper products. The total figure represents an increase of about 28 per cent over the similar month in 1935. Paper imports during the first eight months of 1936 reached a value of $69,083,701, showing an appreciable gain over imports of a value of $58,281,326 in the same period of 1935, according to U. S. Department of Commerce calculations.

EXPORTS

Although exports of paper and paper products from the United States during August dropped off to some extent compared with the month preceding, they were 10 per cent in value above those for the corresponding month last year, while eight months' exports this year recorded a fair rate of increase over a year ago. Most classes contributed to the increase in August over the similar month last year. A few of the larger items, notably uncoated book papers, boards and sheathing paper showed decreases ranging in volume from 50 to 60 per cent. Among the less important items from the standpoint of volume of shipments, decreases also were registered in vulcanized fibre, cash register paper, cover paper and envelopes.

Exports of greaseproof and waterproof papers, however, increased 70 per cent, and those of other wrappings 95 per cent compared with the corresponding month last year. Shipments of overissue newspapers, which may also be classed as a wrapping paper, increased more than 130 per cent, and even greater gains took place in exports of tissue and surface-coated papers, which were 140 and 155 per cent, respectively, higher than in August, 1935. Increases which occurred in shipments of writing and newsprint papers, toilet papers, insulating and wallboards, bags, boxes and a few lesser items were not so outstanding but were nevertheless responsible for the rise in this year's total to $1,889,695 as against $1,716,568 for August, 1935. Total exports in eight months this year were valued at $14,947,287, compared with $13,420,987 in the same time last year.

Exports of paper base stocks in August last amounted in value to $1,139,104, of which $973,069 represented bleached and unbleached sulphite wood pulp and $128,363 rags and other waste stock, comparing with $986,154 in August, 1935. Eight months' shipments this year were valued at $7,923,726, against $6,467,147 in the similar 1935 period.

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